IMPERIAL MYCOLOGICAL INSTITUTE

REVIEW

OF

APPLIED MYCOLOGY

VOL. XIII SEPTEMBER 1934

BIRKELAND (J. M.). **Serological studies of plant viruses.**—*Bot. Gaz.*, xcv, 3, pp. 419–436, 1934.

A fully tabulated account is given of the writer's precipitin tests for the differentiation of certain tobacco viruses, namely, spot necrosis (Johnson's tobacco virus IV), ring spot (tobacco virus V), ordinary mosaic (tobacco virus I), and attenuated forms of spot necrosis and mosaic, as well as tomato and cucumber mosaic [*R.A.M.*, xiii, pp. 328–331].

The juice from virus-diseased plants was found to contain, besides the antigenic constituents of a healthy plant, an antigenic fraction inseparable, by the methods of purification employed (including passage through a Seitz filter), from the virus itself [ibid., xiii, p. 542]. This applied in the case of tobacco virus I whether the virus was grown in tobacco or tomato. The antigenic factor not only accompanies the virus but is specific for a particular one, as shown by the qualitative differences between the antibodies of one virus and those of another. The close association of the antigenic factor with infectivity and the specific nature of the antigenic fractions accompanying the different viruses strongly suggest that the factor in question is either the virus itself or a virus-plant protein complex in which the former acts as a haptene.

MANDELSON (L. F.). **Barn spot of Tobacco. Preliminary investigations and flue-curing experiments.**—*Queensland Agric. Journ.*, xli, 2, pp. 132–147, 1 fig., 1 diag., 3 graphs, 1934.

Investigations carried out in Queensland showed that the optimum, maximum, and minimum temperatures for the growth of *Cercospora nicotianae*, the causal organism of barn spot of tobacco [*R.A.M.*, xiii, p. 277], on potato dextrose agar were, respectively, about 78·8°, 93°, and 45·5° F. As the disease may develop in the curing shed at temperatures over this maximum the spots are probably due not to fungal growth at the time of curing but to the reaction of cells infected in the field. Humidity studies indicated that the development of the spotting varied, up to a point, directly with the relative humidity of the atmosphere in which the leaf is coloured, though fewer spots developed in a saturated atmosphere than in one of 90 per cent. relative humidity. The more mature the leaf tissue the more liable it was to spot.

Leaf flue-cured in a barn where the temperature varied from 98°

to 108° and where the relative humidity for fourteen hours out of the first twenty-four was 96 per cent. or over, developed considerably less barn spot than similar leaf cured in the normal way.

Further experiments are to be undertaken.

Desai (S. V.). **Studies on the nature of the causative agent of the mosaic disease of Tomatoes.**—*Indian Journ. Agric. Sci.*, iii, 4, pp. 626–638, 4 pl. (1 col.), 1933. [Received June, 1934.]

In December, 1931, tomatoes at Pusa developed mosaic symptoms, the plants being stunted and the young leaves small, crinkled, deformed, and marked with yellow patches. The mature leaves remained apparently healthy (though some showed very small necrotic areas), but those not quite mature when infection first appeared developed characteristic markings later.

Attempts to isolate an organism from the diseased tissues gave negative results, and the filtrate from the tomato extract broth in which material of the diseased tissues had been crushed and incubated was used as a stock material for virus studies. To ascertain whether the virus acted as a bacteriophage on organisms present in the plant or in the soil, affected tissues were crushed in nutrient broth, incubated for sixteen hours, and then plated. Five bacterial isolates thus obtained were selected for testing the action of the virus. To young cultures of the organisms 0·2 c.c. of the stock virus filtrate was added, the suspensions then being incubated for five days at 30° C. This process was repeated for ten serial transfers, but no action resembling that of a bacteriophage was detected. Twenty-four representative colonies of organisms isolated from soil, as well as 12 named stock cultures of soil organisms, were similarly tested with the stock virus filtrate by serial passages, again with negative results.

Stems of diseased tomato plants were thoroughly sterilized in 1 in 1,000 mercuric chloride at 37° *in vacuo* for ten minutes. The tissues were repeatedly washed, transferred to a Petri dish, cut lengthwise, and planted on to tomato extract agar slants, after which they were incubated for a long period at 30°. Some of the tubes showed growth after a week and others after one month, all the growths being identical and all showing circular transparent areas. Transfers showed the same transparent areas which were attributed to an associated bacteriophage, but as all attempts to obtain ultra-pure cultures failed, no progress could be made with the study of the bacteriophage, since an increase in virulence could not be brought about.

When 0·1 c.c. of the stock virus filtrate was added to a fresh suspension of the organism isolated from the diseased tissues slight limpidity resulted, indicating the dissolution or flocculation of the bacteria. From the evidence obtained the virus is regarded as possibly a filterable cyclostage in the life-history of the organism.

Inoculations (by scratching the leaves) of young, healthy tomato plants with a suspension of the 8th and 15th serial transfers of the virus in association with the bacterium isolated from the plants filtration being performed before each transfer and 0·1 c.c. of the filtrate added to a fresh bacterial suspension, gave positive results in ten and seven days, respectively, the type of mosaic produced by

the 15th transfer on one plant being very severe. Older plants in insect-proof cages when inoculated with a suspension of the 22nd serial transfer developed typical mosaic in six weeks. The concentration of the original virus extract was 1×10^{-16}, 1×10^{-30}, and 1×10^{-44}, respectively for the 8th, 15th, and 22nd transfers used in these experiments, a dilution precluding any possibility of infective quantities of the original virus having been carried over, and indicating a multiplication of the virus in the presence of the bacterium.

Not only the inoculated leaves but also the stems and petioles of the uninoculated leaves almost invariably contained the same bacterial organism, though none could be isolated from the leaves, stems, and petioles of the controls. From these results the author concludes that the bacteria are in some way connected with the production of the disease.

CIFERRI (R.) & BALDACCI (E.). **Sulle batteriosi, fusariosi, geotricosi e sul marciume apicale (blossom-end rot) dei frutti di Pomodore.** [On bacteriosis, fusariosis, geotrichosis, and blossom-end rot of Tomato fruits.]—*Atti Ist. Bot. R. Univ. di Pavia*, Ser. IV, iv, pp. 204–280, 27 figs., 1933. [Latin summary. Received May, 1934.]

In this paper the authors give a detailed description of their investigation into blossom-end rot of tomatoes [*R.A.M.*, xii, p. 733], in the course of which they isolated from affected material *Fusarium erubescens*, *Penicillium italicum*, and a bacterium (the morphological and cultural characters of which are described), inoculations with all of which failed to produce typical symptoms either on tomatoes or numerous other hosts. Attempts were then made to establish the pathogenicity of various fungi and bacteria, and a list is given of fungi found in different naturally-occurring tomato rots, none of which causes symptoms resembling true blossom-end rot. Of these, the most frequently encountered was the watery rot caused by *Geotrichum lactis* (*Oospora lactis* or *O. lactis-parasitica*) [ibid., viii, p. 140]. The results obtained are fully discussed with numerous references to the relevant literature, and it is concluded that the disease is due to physiological disturbances. A bibliography of 171 titles is appended.

FAWCETT (EDNA H.) & BRYAN (MARY K.). **Color in relation to virulence in Aplanobacter michiganense.**—*Phytopath.*, xxiv, 3, pp. 308–309, 1934.

The pink form of *Aplanobacter michiganense*, the agent of tomato canker, was consistently found to suffer more from adverse environmental conditions than the yellow or white strains arising from it [*R.A.M.*, x, p. 415], having even been rendered non-virulent in many cases. Both rough and smooth colonies occur within any given colour strain, and the pink one has been found to produce transitional salmon, buff, and pale to deep orange forms combining the qualities of roughness and smoothness and apparently representing blends of pink, yellow, and white.

RAMSEY (G. B.). **Pleospora lycopersici E. and E. March., a Tomato pathogen in the United States.**—*Science*, N.S., lxxix, 2048, p. 294, 1934.

Since 1919 Californian tomato stocks have undergone extensive damage, involving losses of 50 to 90 per cent., from *Pleospora lycopersici* E. and E. Marchal [*R.A.M.*, i. p. 62], which does not appear to have been previously identified in the United States. In the early stages brown V-shaped to oval, fairly dry lesions round the stem scar are characteristic symptoms; as the fruits ripen the lesions soften and the black perithecia of the fungus appear in the centre. The conidial stage, *Macrosporium sarcinaeforme* [ibid., xi, p. 377], is also present on the same material. Single ascospores and conidia gave rise to cultures bearing both the perfect and imperfect stages. The average dimensions of *P. lycopersici* on Californian tomatoes are as follows: perithecia 325 to 550 μ in diameter, asci 167 by 28·2 μ, ascospores 34·4 by 15·2 μ, and conidia 26 by 13·5 μ.

WAGER (V. A.). **Fusarium wilt in Tomatoes. Research work in the Eastern Transvaal.**—*Farming in South Africa*, ix, 95, pp. 61–63, 5 figs., 1934.

Popular notes are given on the symptoms, etiology, spread of infection, and control of tomato wilt due to *Fusarium bulbigenum* f. 1 (syn. *F. lycopersici*), with special reference to the work of breeding for resistance now in progress at Nelspruit, Eastern Transvaal [*R.A.M.*, xiii, p. 194].

SCHWARZ (H.). **Das Ulmensterben und sein Erreger.** [The die-back of Elms and its agent.]—*Oesterr. Vierteljahresschr. für Forstwesen*, lxxxiv, 1, pp. 15–18, 1934.

It is estimated that, since the first detection of elm die-back (*Ceratostomella ulmi*) in Austria in 1926 [*R.A.M.*, xi, p. 755], about half the entire stand has been destroyed by the disease [the available information on which is briefly summarized]. Contributory factors in the rapid spread of the disease include the recent succession of dry summers, the sinking of the ground water level, and damage inflicted by the severe winter of 1928–9 and by hoar frosts in 1933. There is considered to be little hope of saving the remaining trees, at any rate by direct control, though an improvement in the situation might be effected by combating the bark beetles (*Scolytus* spp. and *Pteleobius vittatus*) implicated in the transmission of the fungus [see next abstract].

BUISMAN (CHRISTINE). **Verslag van de onderzoekingen over de Iepenziekte, verricht in het Phytopathologisch Laboratorium Willie Commelin Scholten te Baarn gedurende 1933.** [Report of the investigations on the Elm disease conducted in the Phytopathological Laboratory 'Willie Commelin Scholten' at Baarn during 1933.]—*Tijdschr. over Plantenziekten*, xl, 3, pp. 65–87, 1934.

With the help of Miss J. C. Went, the writer pursued her studies on the reaction of a number of European and Asiatic elm species and varieties to *Graphium* [*Ceratostomella*] *ulmi* [*R.A.M.*, xii,

p. 665] in 1933, during which year the die-back occurred in a very severe form in Holland, necessitating the felling of some 70,000 trees, and spreading to new districts. An inspection of the Wadden Islands revealed the combined presence of *C. ulmi* and the elm bark beetles (*Scolytus scolytus* and *S. multistriatus*) on all except Vlieland. Except on Ameland, where 16 cases were observed, the disease is still in the sporadic stage on these islands, where its spread may be arrested by an energetic felling campaign.

Among the European elms, *Ulmus procera monumentalis* and *U.p. berardi* maintained the resistance shown in previous trials, while two varieties of *U. foliacea*, *sowerbyi* and *hillieri*, were little affected by inoculation. *U. foliacea dampieri* and *U. glabra fastigiata*, which do not suffer much from die-back in the field, often contract infection readily on artificial inoculation. Of the Asiatic species and varieties tested, *U. japonica*, *U. laciniata nikkoense*, the Karagatch elm, and *U.* sp. from Central Asia reacted positively to inoculation with *C. ulmi*, while *U. wilsoniana*, *U. macrocarpa*, and *U. pumila* were also somewhat susceptible; *U. pumila pinnato-ramosa*, on the other hand, showed no sign of infection. Two cases of spontaneous infection in *U. pumila* were observed at Amersfoort in 1933, the fungus being isolated from the diseased branches, which had been injured by the gnawing of bark beetles. Both the trees had been grafted high up on Dutch elms (*U. hollandica*), providing a further example of the inadvisability of high grafting with the Asiatic species.

A special series of tests to determine the correct period for successful inoculation showed that, with few exceptions, the chance of positive results increases from the middle of April to the end of May, after which it is likely to decline. Inoculation experiments with spore suspensions of the die-back fungus were successful only on wounded branches. From a diseased elm bark beetle used in feeding tests at Haarlem *Beauveria bassiana* [ibid., xiii, p. 94] was isolated.

Kort verslag van het Iepenziekte-onderzoek, verricht op het Phytopthologisch Laboratorium Willie Commelin Scholten te Baarn, gedurende 1933. [A short report on the Elm disease investigation conducted at the Phytopathological Laboratory 'Willie Commelin Scholten' at Baarn during 1933.]—*Tijdschr. over Plantenziekten*, xl, 3, pp. 88–90, 1934.

The inoculation experiments on elms (totalling about 3,400) with *Graphium* [*Ceratostomella*] *ulmi* [of which particulars are given in the preceding abstract] were carried out in 1933 in five Dutch towns, viz., Baarn, Utrecht, The Hague, Haarlem, and Amersfoort. Lectures were given on the disease by Drs. Westerdijk and Buisman and exhibits of infected material displayed.

Te Wechel (A.). **Houtverlies tengevolge van het schillen van Iepenhout op de opslagplaatsen.** [Loss of wood in consequence of the scaling of Elm wood at the felling sites.]—*Nederl. Boschbouw-Tijdschr.*, vii, 3, pp. 64–72, 3 figs., 1 diag., 1934.

At the instance of the committee for the study and control of

the elm disease [*Ceratostomella ulmi*: see preceding abstracts], the writer investigated the loss of merchantable timber resulting from the decortication of the trees in accordance with the recent enactment of the Dutch Government [*R.A.M.*, xiii, p. 352]. It was found that, where proper care is exercised and the decorticated logs are kept under mats or otherwise suitably protected from the sun, such shrinkage need not exceed 2·7 per cent. of the total weight, but it may easily amount to 10 per cent. where due precautions are neglected.

Nochmals: Der Ulmentod besiegt? [Once again: is the die-back of Elms overcome?]—*Deutsche Landw. Presse*, lxi, 13, p. 154, 1934.

To correct misleading announcements in the press the National Biological Institute, Berlin-Dahlem, states that attempts are in progress to protect healthy, susceptible elms against the elm die-back [*Ceratostomella ulmi*: *R.A.M.*, xii, p. 578] by grafting on to them two Asiatic varieties of established capacity for resistance. The ultimate efficacy of this method, however, remains to be proved.

[This announcement also appears in *Blumen- und Pflanzenbau*, xxxviii, 15, p. 199, 1934.]

Broekhuijsen (M. J.). **Wilgenkanker, veroorzaakt door Discella carbonacea (Fries) Berk. et Br.** [Willow canker caused by *Discella carbonacea* (Fries) Berk. et Br.]—*Tijdschr. over Plantenziekten*, xl, 2, pp. 62–63, 1 pl., 1934.

In March, 1933, willow (*Salix viminalis*) branches from an experimental field were examined at Wageningen and found to bear diffuse, brownish-green, rapidly spreading lesions with darker-coloured protuberances containing the flat, lentiform pycnidia and uniseptate pycnospores on short, simple conidiophores of *Discella carbonacea* [*R.A.M.*, ii, p. 94; xi, p. 423]. Inoculation experiments on healthy willow branches gave positive results and the organism was readily reisolated from the diseased material. The perithecia of *Physalospora salicis* [loc. cit.] were also observed forming sub-epidermal black spots on the dead tips of the willow branches from the above-mentioned experimental field.

Sreenivasaya (M.). **Insect transmission of spike disease.**—*Nature*, cxxxiii, 3358, p. 382, 1934.

Attention is drawn to the importance of differentiating between the non-infectious stunting of sandal [*Santalum album*] in South India due to adverse environmental conditions and the highly infectious and destructive spike disease. Experiments showed that the former trouble, unlike the latter, is not transmissible by grafting and that affected trees, on provision of fresh soil and a new host, make a complete recovery. The recent report of positive results in spike transmission tests with *Moonia albimaculata* [*R.A.M.*, xiii, p. 198] is believed to be based on failure to distinguish between these two types of disturbance.

SMITH (C. O.). **Olive knot on Olea chrysophylla.**—*Phytopath.*, xxiv, 3, pp. 307–308, 1 fig., 1934.

Olea chrysophylla, a native of the East African highlands, was successfully inoculated at Riverside, California, with the olive knot organism, *Bacterium* [*Pseudomonas*] *savastanoi* [*R.A.M.*, xii, p. 458], which was reisolated from the resulting knots. The latter are smaller, less globose, and rougher or more irregular in form than those occurring on the olive, being more like those caused by *P. savastanoi* on *Fraxinus*, *Forestieria*, and *Osmanthus* [ibid., ii, p. 12].

KAWAMURA (E.). **Bacterial blight of Chestnut.**—*Ann. Phytopath. Soc. Japan*, iii, 1, pp. 15–21, 2 pl., 1934. [Japanese, with English summary.]

Bacterium castaneae n.sp., the agent of a disease of chestnuts in Fukuoka, Japan, is a short rod measuring 1 to 1·8 by 0·8 to 1·2 μ, occurring singly or in pairs, motile by one to five polar flagella, Gram-negative, forming neither spores nor capsules, and facultatively anaerobic. On beef agar it forms white, round, slightly undulate, viscid colonies, which assume a radiately rugose aspect on potato agar; gelatine is liquefied, milk peptonized but not coagulated, nitrate and methylene blue reduced, and acid produced from dextrose, saccharose, and glycerine (but not lactose) without gas. The minimum, optimum, and maximum temperatures for growth are below 3°, 25° to 27°, and 35° C., respectively, with a thermal death point between 50° and 51°.

The first symptom of infection with the bacterial blight caused by this organism is a water-soaked spotting of the foliage and young shoots. In the latter, in which and in the buds the disease is most conspicuous, the cortical parenchyma is destroyed with the formation of bacterial cavities, and brown fissures subsequently develop. Similar lesions occur on the petioles and main veins. On young leaves the pathogen causes distortion, and the leaves of infected buds shrivel and die.

RUDOLPH (B. A.). **Bacteriosis (blight) of the English Walnut in California and its control.**—*California Agric. Exper. Stat. Bull.* 564, 88 pp., 17 figs., 1933. [Received May, 1934.]

In the first part of this bulletin the author gives a brief historical, morphological, and biological account of walnut blight and its cause (*Bacterium juglandis*) [*R.A.M.*, xiii, p. 409]—the symptoms being described in detail; in an outline of the geographical distribution of the disease he considers that the 'mal secco' or 'mal nero' disease in Italy attributed by Savastano to *Bact. juglandis* [ibid., iii, p. 524] is not true blight [ibid., xiii, p. 336].

A summarized account is given of the results of large-scale spraying experiments since 1927 in California, which indicate that under the conditions usually prevailing in that State 8-4-50 Bordeaux mixture is the most satisfactory spray for the control of the disease, and that a pre-bloom application is absolutely necessary, as its omission is almost certain to result in heavy infection. While no definite conclusion could be drawn as to the exact date when the second spray should be applied, experimental

data and personal observations indicate that an application immediately after the nuts are set is likely to give better control than a later one; ordinarily, sprays applied in June are of little value, as by that time the rainy season is usually over in California.

For average working conditions in the State, the cost of materials and of application is estimated at 2 cents per gall. of Bordeaux mixture of the given strength, this estimate being stated to be rather on the generous side. Each tree requires, according to size, from 10 to 30 galls. of spray fluid at each application, of which two or three (sometimes more) are necessary. Even at this high figure, the profit of the treatment was calculated to have amounted in certain concrete cases to anything from one to six dollars per tree, depending on the season and on the size of the trees. It is pointed out, however, that in certain cases some loss was incurred, chiefly due to the undesirable effect of the spray on nut sizes resulting from the overloading of the treated trees.

THOMAS (H. E.). **Studies on Armillaria mellea (Vahl) Quél., infection, parasitism, and host resistance.**—*Journ. Agric. Res.*, xlviii, 3, pp. 187–218, 11 pl., 1934.

This is a detailed and fully illustrated account of the author's study of the mode of entrance and subsequent development of *Armillaria mellea* in the roots of walnut (*Juglans regia*), northern California black walnut (*J. hindsii*), peach, pear, and cherry plum or myrobalan (*Prunus cerasifera*) [*P. divaricata*] seedlings, and in carrots, parsnips, dahlias, and potatoes, field observations having indicated that the relative susceptibility of these hosts ranges from high susceptibility in the walnut and peach to high resistance in the pear and black walnut. It was shown that in all these hosts penetration by the parasite was effected directly through the healthy unwounded periderm, at points where the advancing ends of subterranean rhizomorphs [*R.A.M.*, xiii, p. 483] became securely attached to the surface of the root or tuber by means, in part at least, of the mucilaginous substance enveloping the rhizomorph close behind its white tip. At this point the rhizomorph produces one or more branch rhizomorphs, originating in its inner cortical cells, which enter the host as a whole partly by mechanical and partly by chemical action, since there appeared to be some destruction of the suberized walls of the host cells, indicating the possible effect of a suberin-digesting enzyme. Further advance of the invading rhizomorph is preceded in all the hosts by the death of the cells, the advance killing being more extensive in susceptible than in resistant plants. After entry in the former, the invading rhizomorph grows and branches rapidly, and causes general destruction of the surrounding tissue by means of side hyphae which emerge from near its base in a direction perpendicular to its surface, and which follow but do not precede the advancing rhizomorph. In resistant roots, the fungus is unable to establish itself and usually destroys but little of the affected root, the wounds caused by it being either cut off by cork or healing over. Cork formation is induced also in the susceptible hosts (except the potato), but is not constant in either group. Furthermore, the fungus was shown to be readily capable of breaking through

secondary cork barriers, and this, coupled with the fact that in some instances small lesions were found in pear roots, in which the advance of the rhizomorph had been apparently arrested without the formation of cork around it, renders the significance of cork as a factor in resistance doubtful.

The paper also contains a description of the wound gum which was observed in the borders of the lesions in some of the hosts, especially in the walnut and cherry plum, and also of the gum cavities which are of almost constant occurrence in species of *Prunus* affected by *A. mellea*. In a special series of tests it was shown that the fungus grew well on the expressed sap of certain roots, and poorly or not at all on that of other roots, but there seemed to be little correlation between the inhibition of growth in this manner and resistance of the living host. There was also some evidence that structural or morphological differences of the hosts exert little influence on resistance to *A. mellea*, which would appear to be of the nature of an antagonistic influence on the fungus exerted by the host only when the latter is in an active, healthy condition.

New Zealand. State Forest Service. Annual Report of the Director of Forestry for the year ended 31st March, 1933. —15 pp., 1933. [Received 1934.]

The following items of phytopathological interest occur in this report. Pine wilt (*Phomopsis strobi*) is widespread on *Pinus radiata*, *P. muricata*, and *P. canariensis*, chiefly at high altitudes. *Diplodia pinea* [*R.A.M.*, xiii, p. 426] is ubiquitous as a saprophyte, but becomes parasitic, causing die-back, under unsuitable environmental conditions. A secondary effect of this fungus is a bad discoloration of the timber even where the health of the trees is little impaired. Root rot (*Armillaria*) [*mellea*] is of minor importance on exotic pines in cut-over indigenous forest areas. Needle fusion is an obscure disturbance well known in Australia [ibid., xiii, p. 356] on exotic species but only recently detected in the Auckland district of New Zealand.

Hahn (G. G.) & Ayers (T. T.). **Dasyscyphae on conifers in North America. II. D. ellisiana.**—*Mycologia*, xxvi, 2, pp. 167–180, 3 pl., 1934.

A taxonomic study of *Dasyscypha ellisiana* [*R.A.M.*, xii, p. 733], commonly found associated with *D. willkommii* [ibid., xiii, p. 482], on the blue form [var. *glauca*] of *Pseudotsuga taxifolia* attacked by European larch canker in New England and elsewhere, has shown the first-named to be an indigenous species. First collected in 1831 by Schweinitz, who recorded it as *Peziza calycina* Fr., *D. ellisiana* has generally been regarded as a saprophyte, but recent observations indicate that it has assumed a parasitic form on four introduced species in New England, namely, *P. taxifolia* var. *glauca*, *Pinus ponderosa*, *P. flexilis*, and *P. cembra*.

Taxonomic confusion has frequently arisen between *D. ellisiana* and *D. lachnoderma* (Berk.) Rehm, a non-coniferous Discomycete from Tasmania, but these two species, as Massee pointed out (*Journ. Linn. Soc.*, xxxi, p. 503, 1895–7), are quite distinct. The

writers' comparative morphological studies [details of which are given] on the two fungi under discussion confirmed Massee's opinion and further indicated the desirability of transferring *D. lachnoderma* to the genus *Lachnum*, on account of its broad, acerose paraphyses, as *L. lachnoderma* (Berk.) comb. nov. *D. ellisiana*, on the other hand, appears to represent a transitional stage between the forms with filamentous paraphyses and those producing broad, lanciform structures, and should consequently be retained within the genus *Dasyscypha*. An amended description of this fungus is given in which the imperfect stage is reported for the first time, consisting of an erumpent stroma, 106 to 132 μ in diameter, closed at first, then opening with a single exposed chamber, or compound, with more than one locule, 243 to 433 μ in diameter; fusiform conidia, 5 to 5·8 by 0·9 to 1·2 μ, are abstricted from the tips of short, subulate, acute, simple or verticillately branched conidiophores. *D. ellisiana* has been found along the coast from Maine to Texas on 15 species of *Pinus* as well as on Douglas fir, larch (*Larix europaea* and *L. leptolepis*), and spruce (*Picea engelmanni*).

Rohde (T.). **Das weitere Vordringen der Rhabdoclineschütte in Deutschland.** [The further advance of the *Rhabdocline* leaf fall in Germany.]—*Forstarchiv*, x, 5, pp. 68–69, 1 map, 1934.

The present position of the leaf fall (*Rhabdocline*) [*pseudotsugae*] of Douglas fir [*Pseudotsuga taxifolia*] in Germany [*R.A.M.*, xiii, p. 482] is briefly indicated. In the west the disease extends in all probability from Flensburg to Trier [Treves], infection in some cases being traceable as far back as 1925. The eastern centres of infection all appear to be of recent date, and it is stated that one has been detected in Poland. The total number of localities from which *R. pseudotsugae* has been recorded so far is 114, but the list is stated to be far from complete, especially as regards the eastern districts.

Dodge (B. O.). **Gymnosporangium myricatum in relation to host parenchyma strands.**—*Mycologia*, xxvi, 2, pp. 181–190, 2 pl., 2 figs., 1934.

A full account is given of the mode of penetration of *Gymnosporangium myricatum*, the agent of a destructive witches' broom disease of *Chamaecyparis thyoides* in New York, into its host. Infection appears to take place first near the tip of a shoot, the green tip of the main axis becoming infected through the leaves before cork formation begins. The hyphae extend to the centre of the twig and also longitudinally in fascicles or synnemata which may become cut off by a meristem formation around the strand; from this meristem tracheids arise. Before the meristems form there is usually a multiplication of the thin-walled parenchyma, containing haustoria, of the cortex or medullary rays. Thus the fungus seems to run in a strand of parenchyma, simulating an intrusive growth. Each hyphal cell is binucleate. A thin haustorial thread invades the wall of the host cell and forms the haustorium, which almost reaches maturity without a nucleus but eventually acquires the two from the mother cell. The parenchyma strands

never invade the wood rings, their occasional apparent occurrence in which denotes that they have had wood laid down around them.

Young seedlings or branches attacked in the growing region are liable to permanent dwarfing and premature death, the latter effect also frequently following the profuse formation of witches' brooms on large trees.

Dodge (B. O.). **Witches' brooms on Southern White Cedars.**—*Journ. New York Bot. Gard.*, xxxv, 411, pp. 41–45, 2 figs., 1934.

A semi-popular account is given of the witches' broom disease of southern white cedar (*Chamaecyparis thyoides*) caused by *Gymnosporangium myricatum* [see preceding abstract], the alternate hosts of which are species of *Myrica*, along the Atlantic coast of the United States from Cape Cod to South Carolina. *G. botryapites* [*R.A.M.*, xi, p. 140] is another common but less destructive parasite of *C. thyoides*, on which it stimulates an excess of wood production resulting in the formation of a spindle-shaped burl at the point of infection. *Amelanchier* [*canadensis* and *A. intermedia*] are the alternate hosts of this species.

Uno (S.). **Studien über Bambusse II. Über die Fäulniss des Bambusses.** [Studies on Bamboos II. On the decay of the Bamboo.]—*Bull. Utsunomiya Agric. Coll., 1934*, 4, pp. 47–56, 1 pl., 1934. [Japanese, with German summary.]

In studies of the fungal decay of cut bamboo canes due to *Poria vaporaria* and *Irpex consors*, the writer found that the inner wall of the cane was more liable to rotting than the outer one, the greater rapidity of decay of the former being apparently correlated with a higher raw protein and starch content. *P. vaporaria* was found to be generally more active than *I. consors* on the bamboo varieties under observation, of which Ma was the least and Taisan the most susceptible to both fungi.

Rumbold (Caroline T.). **A new species of Graphium causing lumber stain.**—*Phytopath.*, xxiv, 3, pp. 300–301, 1 fig., 1934.

English and Latin diagnoses are given of *Graphium rubrum* n.sp., found in association with *Ceratostomella pilifera*, *C. pluriannulata* [*R.A.M.*, xii, p. 665], and *G. rigidum* [ibid., viii, p. 746] on freshly cut sapwood of poplar (*Populus deltoides*), oaks (*Quercus alba* and *Q. lyrata*), *Liquidambar styraciflua*, and pine in Wisconsin.

The new species is characterized by dark brown to black synnemata, 480 to 2,000 μ (average 780 μ) in height and 9 to 86 μ (45 μ) in breadth, the head composed of hyaline, branched hyphae bearing oblong, hyaline, primary conidia, 4 by 2 μ, united by a carmine-coloured mucus into a globule ranging from 18 to 425 μ (average 200 μ) in diameter. Under unfavourable conditions the conidia form yeast-like budding colonies. The cultures change from hyaline to grey, slate, and slaty-black with maturity. Clavate, hyaline, secondary conidia, 8·5 by 3·2 to 14 by 2 μ (6·5 by 2 μ), develop on the hyphae or at the tips of simple, erect conidiophores in culture. A preliminary description of this fungus was

given by the writer in *Naturw. Zeitschr. für Forst- u. Landw.*, ix, p. 429, 1911.

Inoculation experiments with a pure culture from *L. styraciflua* resulted in a grey to greyish-black stain on this host and in a pale grey discoloration of *Pinus echinata* and *P. taeda*.

HUBERT (E. E.). **The protection of jointed wood products against decay and stain.**—*Univ. of Idaho Bull.*, xxix, 3 (*School of Forestry Bull.* 4), 33 pp., 10 figs., 1934.

A detailed account is given of an investigation started in 1930 at the Idaho School of Forestry for the purpose of finding an effective and economic method of protecting wood joints in structures exposed to weather conditions against decay and disfiguring stains. Broadly outlined, the work (most of which was done on cut-off corner joints of *Pinus ponderosa* window sashes, chiefly sapwood but with occasional pieces of heartwood) consisted of preliminary laboratory tests to determine effective means and materials for preventing rotting and staining, followed by tests in a specially constructed cellar to corroborate the results obtained in the laboratory and to try out new compounds, and finally of laboratory tests to determine the efficacy of various paints and water-repellent coatings against the absorption of moisture by the wood and against attack by wood-destroying fungi, as represented in the experiments by *Lenzites trabea* [*R.A.M.*, xi, pp. 84, 684]. The results [which are fully described and discussed] indicated that a satisfactory measure of protection of the wood joints may be obtained by applying a toxic, penetrating chemical compound to a part or to the whole of the joint, or by placing the compound in a shallow cup carved out in the tenon of the joint; or alternatively by treating the joint as above with a water-repellent substance possessing high wood-penetrating qualities. In certain cases these two methods may be usefully combined. Of the many substances tested, the following ten were found to be the most effective, in ascending order of their approximate cost: Protection (a proprietary preparation), Bruce preservative, gasolene-naphthalene-paraffin, zinc bronze paint, zinc chloride-borax, sodium fluoride-borax, linseed oil-white lead paints, zinc priming-paint (two coatings), lignasan [ibid., xiii, p. 341], and treheal.

GILLANDERS (E.), KING (C. G.), RHODES (E. O.), & ROCHE (J. N.). **The weathering of creosote.**—*Indus. & Engin. Chem.*, xxvi, 2, pp. 175–183, 3 figs., 3 graphs, 1934.

Full technical details are given of the construction and use of a machine to determine within a reasonably limited period the effects of weathering on small pine sapwood blocks evenly impregnated with creosote. The course of weathering was followed by removing a certain number of blocks at stated intervals and noting (1) their resistance to direct attack by fungi (e.g., *Fomes annosus* and *Lentinus lepideus*), (2) the percentage loss of oil, (3) the toxicity of the extracted oil, and (4) the distillation range of the latter. Nine weeks' treatment in the machine is said to correspond to many years' service in the open.

Phillips (M.). **The chemistry of lignin.**—*Chem. Reviews*, xiv, 1, pp. 103–170, 1 fig., 1934.

A comprehensive summary, supplemented by a bibliography of 304 titles, is given of the literature on the more important facts pertaining to the chemistry, metabolism, and microbiological decomposition of lignin [cf. *R.A.M.*, xiii, pp. 196, 279].

Gilbert (W. W.) & Popenoe (C. H.). **Diseases and insects of garden vegetables.**—*U.S. Dept. of Agric. Farmers' Bull.* 1371, 46 pp., 65 figs., 1934.

This is a revision of the bulletin originally issued in 1924 dealing in popular terms with the symptoms, etiology, and control of some well-known diseases and pests of garden vegetables in the United States [*R.A.M.*, iii, p. 495].

Blank (L. M.). **Uniformity in pathogenicity and cultural behavior among strains of the cabbage-yellows organism.**—*Journ. Agric. Res.*, xlviii, 5, pp. 401–409, 1934.

A detailed account is given, in continuation of the author's studies of cabbage yellows (*Fusarium conglutinans*) [*R.A.M.*, xiii, p. 2], of his investigation of the comparative pathogenicity and behaviour in pure culture of 19 isolates of the organism obtained from eleven of the United States. The result of the cultural tests failed to reveal any significant differences in the rate of growth, colour production, and sporulation of these strains, and also of the hyphal-tip lines derived from certain of them. Sectoring was observed in the hyphal-tip lines of only one strain. The uniformity of the strains was further confirmed by pathogenicity trials on selected lines of cabbage and on other subspecies of *Brassica oleracea* [loc. cit.], all giving one common type of reaction on these hosts. Homozygous susceptible lines of cabbage were uniformly attacked by all the strains except two, which showed a lesser degree of virulence than the rest, while homozygous resistant lines proved to be equally resistant to all the isolates at 24° C. No evidence of specialization in parasitism was observed on the six subspecies of *B. oleracea* that were tested.

These results, taken in conjunction with the fact that in the F_2 progeny of crosses between resistant and susceptible lines of cabbage the proportion of plants which became diseased when tested with nine strains was in all cases close to the expected 25 per cent., is considered to indicate that specialization of *F. conglutinans* is not a vital factor in the problem of selection and breeding for resistance to cabbage yellows.

Stapp (C.). **Prüfungen von Busch- und Stangenbohnen auf Widerstandsfähigkeit gegen den bakteriellen Erreger der Fettfleckenkrankheit.** [Tests of bush and pole Beans for resistance to the bacterial agent of the grease spot disease.]—*Angew. Bot.*, xvi, 2, pp. 207–218, 1 fig., 1934.

Continuing his studies on the varietal reaction of beans [*Phaseolus vulgaris*] to grease spot disease (*Pseudomonas* [*Bacterium*] *medicaginis* var. *phaseolicola*) [*R.A.M.*, xii, p. 742; see also xiii, p. 490], the writer tested 75 bush and 40 pole varieties from this

standpoint. The results of the inoculation experiments [which are discussed and tabulated] showed a general superiority of pole over bush beans in respect of resistance to grease spot, the wax varieties in the latter group being particularly susceptible. Under the conditions of the experiments only three bush varieties gave evidence of resistance, viz., Holländische Schwertbohne, Allererste Weisse Treibbohne, and Kaiser Wilhelm, while six of the pole type withstood infection, namely, Avantgarde, Zehnwochen, Bahnbrecher, Arabischer weisser Czar, Arabische Zweifarbige, and Arabische Schmetterlingsbohne.

Esau (Katherine). **Cell degeneration in relation to sieve-tube differentiation in curly-top Beets. A preliminary note.**—*Phytopath.*, xxiv, 3, pp. 303–305, 1 fig., 1934.

In the leaves and roots of curly top beets in California visible pathological changes were found to occur only after the differentiation of the primary sieve-tubes, affecting the cells surrounding these [*R.A.M.*, xiii, p. 145]. In the root tips the cells adjacent to the protophloem sieve-tubes develop inclusion bodies and undergo hypertrophic and necrotic modifications. In the later stages of infection degeneration spreads to other phloem cells, causing the formation of a peculiar hyperplastic tissue. In diseased beet roots the phloem of the newly formed, concentric rings of vascular tissue resulting from secondary growth also becomes involved. The sieve-tubes would thus appear to play an important part in the initiation of degenerative changes in curly top beets, perhaps because they act as channels for the translocation of the virus.

Goto (K.). **Relations between length and width suggesting volume-constancy in the under-cell of teliospores of Onion rust.**—*Ann. Phytopath. Soc. Japan*, iii, 1, pp. 22–36, 4 graphs, 1934.

A method is detailed, based on the calculation of the length to width relations, for the determination of the volume of the lower cell of the teleutospores of the rust (*Puccinia*) [*allii* or *P. porri*: *R.A.M.*, xiii, p. 73] on *Allium* spp. (chiefly *A. fistulosum*, but also on *A. schoenoprasum*, *A. bakeri*, and *A. scorodoprasum*) in Japan. From the resulting data [which are discussed and tabulated] it is apparent that a considerable degree of volume constancy characterizes the organs under observation, though their shape varies conspicuously.

Du Plessis (S. J.). **Pink root and bulb-rot of Onions.**—*Farming in South Africa*, ix, 95, p. 70, 1934.

In the author's studies on pink root (*Fusarium cepae* and *Phoma terrestris*) and bulb rot (*F. cepae*) in South Africa, it has been found that these fungi may cause losses amounting to between 20 and 30 per cent., and losses of up to 50 per cent. may occur when they are accompanied by white mould [(?) *Sclerotium cepivorum*: ibid., xii, p. 135; xiii, p. 348]. A number of commercial varieties, viz., Australian Brown, Cape Straw Coloured, Danvers Yellow, Early Flat Yellow Cape, Paris Silver Skinned, Prize Taker, Spanish Brown, and White Queen, were all found to be susceptible.

Garlic, leeks, and shallots are also subject to pink root but not to bulb rot. Plants growing at a temperature of 25° C. were more severely attacked than at 30°, and infection was more prevalent on dry than on moist soils. Moderate nitrogenous manuring exercises a beneficial effect on the course of the disease, while adequate protection may be ensured by 15 minutes' immersion of the seed in 0·1 per cent. mercuric chloride. The most practical and satisfactory method of control on seed-bed soil is to burn straw or shrubs on the ground for 45 minutes, so that the skin of a potato buried 3 in. deep before treatment would readily peel off afterwards. Brief notes are given on the fertilization and irrigation of the onion fields, in which biennial rotation at least should be practised.

Walker (J. C.) & Murphy (A.). **Onion-bulb decay caused by Aspergillus alliaceus.**—*Phytopath.*, xxiv, 3, pp. 289–291, 1 fig., 1934.

Aspergillus alliaceus Thom & Church [cf. *R.A.M.*, v, p. 700], a yellow-spored, sclerotium-forming species, has twice been intercepted, in 1919 and 1929, on garlic entering United States ports from Italy. Inoculation experiments on wounded onion bulbs resulted in the production of a brown discoloration, shrinkage, and eventual desiccation of the tissues. At favourable temperatures for the pathogen (28°, 32°, and especially 36° C.) a dense, white mycelial mat is formed between the bulb scales, and white, later black sclerotia develop throughout the rotted tissue. The conidia are produced abundantly on the surface of decaying bulbs at high relative humidity. *A. alliaceus* proved incapable of attacking growing White Portugal onion plants, confining its pathogenicity to the mature bulbs, on which it may be combated by keeping the storage temperature below 20°.

Cochran (L. C.). **The host specificity of Septoria petroselini and S. apii-graveolentis.**—*Phytopath.*, xxiv, 3, pp. 309–310, 1934.

In a previous paper [*R.A.M.*, xii, p. 196] the writer showed that the two species of *Septoria* attacking celery, namely, *S. apii* and *S. apii-graveolentis* were unable to attack parsley. Further cross-inoculations with *S. petroselini* from parsley and *S. apii-graveolentis* from celery (both obtained from Baarn) showed that each is specific to its own host. These results are considered to afford further justification for the separation of the parsley and celery species of *Septoria*.

Abdel-Salam (M. M.). **Botrytis disease of Lettuce.**—*Journ. Pomol. and Hort. Science*, xii, 1, pp. 15–35, 1 pl., 1934.

A detailed account is given of the author's investigation of the disease of lettuce caused by *Botrytis cinerea* in England, where it is stated to be widely distributed. The results indicated that the most serious phase is the collar rot (locally known as 'red leg' in the Thames Valley) produced in young lettuce seedlings, especially at the time when they are transplanted from the frames to the field in the spring, when as many as 70 per cent. of the seedlings may be killed. This form of the disease does not usually affect

sowings made in the open in late spring or in summer, but throughout the summer slight damage may be caused by lesions on the stems and lower leaves. *B. cinerea* has also been found to attack and kill lettuce plants in the field when they are injured by frost or affected with a trouble known in the Thames Valley as 'greasiness' and similar to the disease described as tipburn in America [*R.A.M.*, vii, p. 422].

Infection with *B. cinerea*, either natural or artificial, was much less in warm greenhouses than in cold frames, and there was a suggestion that high atmospheric humidity is probably more conducive to attack than high soil humidity. The incidence of the disease is increased by abnormally early sowing in the autumn, although seedlings sown at the normal time may also occasionally exhibit a high percentage of attack when planted out in the spring. Overwintered seedlings usually show a higher incidence of the disease when planted out early in the spring than those transplanted later. Of ten varieties tested for relative susceptibility, the cabbage type Lee's Immense was the most resistant, followed by the Cos types Bath's Black-seeded and Hick's Hardy White. It is suggested that resistance is correlated with the development of an infiltrated layer of a gum-like substance which forms in the healthy tissue bordering the lesions. Steeping the overwintered seedlings before planting out in a 0·5 per cent. uspulun or nugreen solution for half to one hour gave promise of value in the control of the 'red leg' form of the disease, but applications of uspulun to the soil of the cold frames during the growth of the seedlings caused considerable permanent stunting of the plants.

Isolations from diseased plants throughout the year yielded 13 strains of *B. cinerea* falling into two groups, one of which is characterized by the profuse development of sclerotia with few conidia, and the other by the development of abundant conidia with few or numerous sclerotia.

SLEETH (B.). **Fusarium niveum, the cause of Watermelon wilt.** —*West Virginia Agric. Exper. Stat. Bull.* 257, 23 pp., 3 figs., 2 graphs, 1934.

The section of this paper dealing with physiologic specialization in *Fusarium niveum*, the agent of watermelon wilt [*R.A.M.*, xiii, p. 5], is partially covered by an earlier abstract [ibid., xi, p. 422]. The optimum temperature for the growth of the fungus in culture was found to lie between 24° and 28° C., the minimum being about 5° and the maximum just above 35° [ibid., vii, p. 422]. Grown on an ammonium-nitrate solution with an initial hydrogen-ion concentration of P_H 4·4, strains 5, 8, 20, and 23 (from Oregon, Iowa, North Carolina, and Texas, respectively) increased the acidity to about P_H 3·8 in 72 hours, followed by a decrease to between P_H 7·5 and 7·8 at the end of 36 days. Dissociants of strains 11 and 16 (from South Carolina and West Virginia, respectively) developed both in culture and on plants growing in soil inoculated with these strains. The apparent collapse of resistance in a given variety to *F. niveum* may be explained on the basis of the appearance by dissociation of new strains of enhanced virulence derived from those of restricted pathogenicity. It is obvious, therefore, that trials of

varietal reaction to watermelon wilt should include a number of virulent physiologic forms.

Beaumont (A.) & Staniland (L. N.). **Tenth Annual Report of the Seale-Hayne Agricultural College, Newton Abbot, Devon, for the year ending September 30th, 1933.**—39 pp., 1 fig., 2 diags., 1934.

In this report notes are given on fungal diseases observed during the year in the south-west of England on cereals, potatoes, root crops, broad beans [*Vicia faba*], vegetables, fruit, and flowers. Infection by potato blight [*Phytophthora infestans*] was slight, and good results were again given in forecasting outbreaks by the humidity method, the attacks following exactly the temperature and humidity conditions previously reported as conducing to infection [*R.A.M.*, xiii, p. 8]. A day is counted as favourable to blight when there is (1) dew either the night before or in the morning, (2) minimum temperature of 50° F. or above, (3) sunshine of less than 5 hours, (4) rainfall at least 0·01 inch, (5) relative humidity at 3 p.m. not less than 75 per cent. A favourable period early in June was succeeded by warm, dry weather, and no outbreak occurred then. Humidity was high all day on 8th, 11th, 13th, and 17th to 19th July, and blight broke out in many parts of Devonshire between 15th and 20th July, and at Seale-Hayne on 29th. During August, high humidity prevailed all day only on 15th, and the disease made very slow progress. The humidity data clearly account for the exceptionally light infection, there being only 16 days of high humidity in the period May to August, while the average 3 p.m. humidity for May, June, July, and August was only 67·7, 67·4, 67·7, and 62·5 per cent., respectively. Blight first appeared in West Cornwall on 7th May; from 23rd April to 14th May the 3 p.m. humidity was 75 per cent. or over every day at the Lizard and during the first week in May the daily minimum temperature was significantly higher in West Cornwall than at Seale-Hayne, being 50° or 51° F. on six days out of eight in the former locality, whereas in the latter it was 44° and 45° on two days, respectively, 47° on two days, and on no occasion over 49°. Thus, though the humidity was favourable for blight during many days in late April and early May at Seale Hayne, the temperature never reached the requisite point in that locality.

In an experiment for the control of club root [*Plasmodiophora brassicae*: loc. cit.] 1 cwt. ground burnt lime was spread over one-eighth acre of an infected field sown to marrow stem kale [Chou moellier: *Brassica oleracea* var. *acephala*: ibid., xiii, p. 71], Bruce turnip [ibid., xiii, p. 343], and another variety of common turnip on one farm, and 1 cwt. hydrated lime over one-tenth acre on a similarly infected field of Balmoral and King of the West swedes on another farm. The P_H value of the limed plots was, respectively, 7·02 and 6·76 and that of the unlimed 6·35 and 6·14. On the first farm the kale remained healthy in both the treated and untreated soil, but while the turnips in the unlimed soil became badly infected, those in the limed ground were unaffected. On the second farm the disease was prevalent though mild on both varieties of swede in the unlimed plot, but only one diseased root

could be found in the treated soil. The result obtained on both farms is attributed to the effect of the liming in raising the P_H value of the soil above 6·6, this value being regarded as the probable limit for club root.

Krankheiten und Beschädigungen der Kulturpflanzen im Jahre 1931. [Diseases and pests of cultivated plants in the year 1931.]—*Mitt. Biol. Reichsanst. für Land- und Forstw.*, 48, pp. 1–62, 2 graphs, 48 maps, 1934.

This survey of the fungous diseases and insect pests attacking cultivated plants in Germany in 1931 is compiled on the same lines as the previous report [*R.A.M.*, xi, p. 693]. The distribution of the various disorders is represented by maps.

Petri (L.). **Rassegna dei casi fitopatologici osservati nel 1933.** [Review of phytopathological records noted in 1933.]—*Boll. R. Staz. Pat. Veg.*, N.S., xiv, 1, pp. 1–78, 6 figs., 1934.

This report [cf. *R.A.M.*, xii, p. 743] contains among many others the following items of phytopathological interest. During the past three years a serious wilt of Uva di Troia vines grafted on 3309 has occurred in the vicinity of Barletta, caused probably by environmental conditions assisted by the commonly observed mycosis of the stem and branches which produces rapid withering; this mycosis, considered by Viala and Marsais to be a cause of court-noué [ibid., xiii, p. 422], the author regards only as a secondary symptom, aggravating and accelerating the wilt set up by leaf roll or other diseases. Extensive necrotic areas due to pruning wounds were present in the wood of the stock. Various weak parasites and a sterile mycelium which in some respects resembled that of *Pumilus medullae* [loc. cit.] were isolated from the affected plants. Vines, especially the Barbèra variety, growing at Casale Monferrato showed dark, sunken spots on the berries very similar to bitter pit of apples, while the leaves were also markedly deformed; it is thought that the condition may be due to a virus.

Peaches at Trieste were attacked by *Bacterium pruni* [ibid., xii, p. 268], and strawberries near Pisa developed a root rot of undetermined origin [ibid., xiii, p. 454]. Tomato wilt (*Fusarium lycopersici*) [ibid., xii, p. 732] was reported from numerous localities in Liguria, Lazio, Puglia, and Sicily. In one experimental plot at Taranto the Break o' Day variety was highly resistant. Tomatoes affected by mosaic were received from Eritrea and Bari. Many fields of *Trigonella* at Agrigento were severely attacked by *Sclerotinia trifoliorum* and *S. libertiana* [*S. sclerotiorum*].

Conners (I. L.). **Thirteenth Annual Report of the Canadian Plant Disease Survey 1933.**—pp. i–ix, 1–75, 103–128, 1934. [Mimeographed.]

Since the publication of Sanford's note on a new foot rot of oats in Alberta [*R.A.M.*, xiii, p. 224], two organisms have been isolated from diseased material, namely, *Fusarium equiseti* [ibid., ix, p. 667] and an unknown, dark, sclerotial fungus. Work on the pathogenicity of these is in progress.

The British Columbian Lytton strain of lucerne was severely infected at Ottawa and ten other stations between Alberta and Quebec by downy mildew (*Peronospora aestivalis*) [*P. trifoliorum*: ibid., xii, p. 177], which is evidently a disease of serious potentialities.

In Ontario lettuce was heavily damaged by marginal leaf spot (*Pseudomonas marginalis*) [*Bacterium marginale*: ibid., xii, p. 677], and pepper [*Capsicum annuum*] fruits were attacked by *Sclerotium bataticola* [*Macrophomina phaseoli*: ibid., ix, p. 82], both new records for the country. *Pythium ultimum* [ibid., xiii, pp. 5, 394] caused a destructive soft rot of seed potato tubers in British Columbia.

The only new fruit disease reported during the period under review was false blossom of cranberry [see below, p. 589]. Strawberries at Stamford, Ontario, exhibited symptoms noticeably resembling those of 'xanthosis' and 'yellow edge' [ibid., xiii, p. 314].

Notes are given on a number of other diseases of cereals, forage and fibre plants, vegetable and field crops, forest and shade trees, and ornamentals [cf. ibid., xii, p. 551], and a list has been compiled of over 400 specimens of fungi from miscellaneous plants added to the Mycological Herbarium, Division of Botany, Ottawa, during the year.

ADAMS (J. F.). **Report of the Plant Pathologist for 1933.**—*Quart. Bull. State Board of Agric., Delaware*, xxiv, 1, 15 pp., 1 diag., 1934.

In this report, which is on the same lines as those for previous years [*R.A.M.*, xii, p. 612], the author states that during the period under review the spray service in Delaware was conducted in the same manner as that established during the previous seven years. Overwintered apple leaves showing infection by scab [*Venturia inaequalis*] were collected during March; with the approach of the fungus to maturity spore traps were set up for study during the primary infection period of April, May, and June, the information so obtained being essential for timing early spray recommendations. The rainfall and spore discharge data for the season are given; in 1933 there were four periods of major spore discharge, as compared with three in 1932.

In Delaware official spray notes for fruit orchards are issued (through the county agents) according to the prevailing climatic conditions and pest and disease development, in co-operation with the entomologist; during the 1933 growing season eleven editions of these notes were issued.

Notes are given on the diseases of economic crops observed in Delaware during 1933.

MANNS (T. F.) & ADAMS (J. F.). **Department of Plant Pathology.**—*Ann. Rept. Delaware Agric. Exper. Stat. for the fiscal year ending 30th June, 1933* (*Bull.* 188), pp. 36–46, 1934.

Studies on the masking of yellows and little peach in other species of *Prunus* indicated that some varieties of plums may act as carriers of these diseases, which can be disseminated from them by the leafhopper *Macropsis trimaculata* [*R.A.M.*, xii, p. 518];

this insect vector lives principally on the plum and is very sparingly found on peach trees. During the past two years both diseases were transmitted by budding into plum varieties and the Japanese variety Abundance (*P. salicina*) was shown to carry the viruses of both without any marked symptoms, and to be capable of reinfecting the peach by budding. Both viruses were probably introduced into America on Oriental plum varieties.

The evidence obtained in field control experiments and sprayed commercial plantings supported the view that the zinc-lime spray (4–4–50 or 5–5–50) against bacterial spot [*Bacterium pruni*: ibid., xii, p. 145] is beneficial to peach trees apart from the control of the disease. This spray, in combination with lead arsenate, was consistently associated with less arsenical injury on peach foliage than were various sulphur sprays. Post-harvest or spring applications of zinc-lime (8–8–50) reduced the amount of disease present as effectively as summer applications at a concentration of 4–4–50.

The results of field control experiments did not justify the complete substitution of zinc-lime for any of the sulphur sprays for the control of peach brown rot [*Sclerotinia americana*] and scab [*Cladosporium carpophilum*: ibid., xii, pp. 11, 573, 709]; zinc sulphate (2 lb. to 50 galls.), in combination with reduced quantities of certain sulphur sprays, gave practical control of *C. carpophilum* in cases of moderate infection.

Bacterial leaf spot [*Bact. phaseoli* var. *sojense*: ibid., ix, p. 228] was the only disease prevalent on soy-beans in commercial plantings in 1932. Sowings were again made during July from the source of seed reselected for three successive years from resistant plants, and even in the first week in September only 7 plants were diseased in 100 yds. of drill row.

Toxicity tests with commercial summer oil sprays indicated that the use of certain summer oil sprays may entirely offset early season control of plant diseases and accelerate mid-season infection.

In the growing season of 1932 conditions were more favourable for apple scab [*Venturia inaequalis*] than they were in 1931. In the latter year 90 per cent. of the spores were mature by 27th March, but in 1932 this stage of maturity was not reached until 22nd April. In both years, however, the initial spore discharge occurred on 26th April [cf. preceding abstract].

Summary of research, 1887–1933. Forty-fifth Annual Report. —*Arkansas Agric. Exper. Stat. Bull.* 297, 126 pp., 3 figs., 1934.

This report contains scattered references of phytopathological interest, the more recent of which have already been noticed in this *Review* from other sources.

Curzi (M.). **De fungis et morbis africanis. II. De Pseudomonas plantarum parasitis Somaliae.** [Of African fungi and diseases. II. Concerning *Pseudomonas* parasitic on plants in Italian Somaliland.]—*Boll. R. Staz. Pat. Veg.*, N.S., xiv, 1, pp. 173–184, 2 pl., 1934. [Italian, with English summary.]

Notes are given on the following bacterial diseases of plants recently observed in Italian Somaliland [cf. *R.A.M.*, xii, p. 246],

viz. *Pseudomonas* [*Bacterium*] *malvacearum* on cotton, *P.* [*Bact.*] *phaseoli* on *Dolichos*, *P. ricinicola* [*Bact. ricini*] on castor (*Ricinus communis*), *P.* [*Bact.*] *sesami* on sesame, *P.* [*Bact.*] *solanacearum* on groundnut, castor, and Cavendish banana (*Musa chinensis*) [*M. cavendishii*], and *P.* [*Bact.*] *tumefaciens* on cassava.

The record of *Bact. ricini* on castor is stated to be the first outside Japanese territory [cf. ibid., viii, p. 221; xii, p. 554]. In Italian Somaliland it is very prevalent during wet weather, producing on the leaves polyhedric spots 1 to 4·5 (mostly 2 to 2·5) mm. wide, covered with bacterial exudate. The mesophyll of the affected parts is greatly changed, the epidermis is usually detached, and between the latter and the palisade numerous bacteria are present. Originally named *Bact. ricini* the organism was renamed *Bact. ricinicola* by Elliott to avoid confusion with *Phytomonas ricini*. The author adopts Elliott's specific name but transfers the species to *Pseudomonas* as *P. ricinicola* n. comb. In agreement with the Japanese workers *Phytomonas ricini* is considered only a synonym of *Pseudomonas* [*Bact.*] *solanacearum*.

The sesame bacteriosis caused by *Bact. sesami* is both vascular and parenchymatous and has many points in common with the disease produced on various hosts by *Bact. solanacearum*; it is perhaps identical with the sesame disease attributed to the latter organism by Kornauth and Smith in 1903 and by Honing in 1913. Smith considered both diseases to be identical and due to *Bact. solanacearum*, which, however, Nakata [ibid., ix, p. 577] and Kovačevski [ibid., ix, p. 698] have shown to be distinct from *Bact. sesami*.

The groundnut bacteriosis caused by *Bact. solanacearum* [ibid., xi, pp. 123, 621] is one of the most serious affections of this host in Italian Somaliland. Plants severely attacked show dark spots at the base of the branch system and stem, the epidermis being ruptured and a dark bacterial exudate present. On castor *Bact. solanacearum* causes a wilt of well-developed as well as small plants. Banana wilt due to the same organism [ibid., ix, p. 89] was frequently observed, especially in abandoned or neglected plantations; the affected plants appear as if suffering from drought, the leaves almost ceasing growth, turning yellow, wilting, and drooping over the base of the stalks. Occasionally, the plants show no serious outward symptom, but in such cases the vessels are discoloured and contain bacteria.

WHITAKER (T. W.). **The occurrence of tumors on certain Nicotiana hybrids.**—*Journ. Arnold Arboretum*, xv, 2, pp. 144–153, 1 pl., 1 fig., 1934.

The spontaneous tumours, closely resembling those due to crown gall [*Bacterium tumefaciens*], occurring first on the roots and later on the stems of F_1 species hybrids between *Nicotiana glauca* and *N. langsdorffii* and apparently first described by Kostoff [*R.A.M.*, ix, p. 797; xiii, p. 498], appear from all the available evidence to result directly from internal disturbance associated with the introduction of the chromosome complement (haploid 9) of *N. langsdorffii* (pollen parent) into the cytoplasm of *N. glauca* (seed parent), the haploid chromosome number of which is 12, while that of the

hybrid (root tip) is 21. Tumours only resulted when *N. glauca* was the female parent.

Neill (J. C.). **Field trials with 'ceresan new' seed dust.**—*New Zealand Journ. of Agric.*, xlviii, 5, pp. 269–271, 1934.

In 1933–4, eighty-one trials of 'ceresan new' dust were carried out on field crops of oats, barley, wheat, and peas in New Zealand [*R.A.M.*, xiii, p. 501], the method adopted being to record only visible outstanding differences between it and other seed treatments in use on the farms. The results showed that cereal seed dusted with ceresan new frequently germinated better than seed left untreated or treated by other methods. The control of oat smuts [*Ustilago avenae* and *U. kolleri*] was at least as effective as that given by formalin, mercuric chloride, or Clarke's protector. No effect on peas was observed.

Brodsky (J.). **Der Einfluss der kohlensauren Kupferbeizen für Getreide auf den Tierorganismus.** [The influence of copper carbonate disinfectants on the animal organism.]—*Arch. für. Gewerbepath. und Gewerbehyg.*, v, 1, pp. 91–107, 5 figs., 1933.

Full clinical details are given of pulmonary and digestive disturbances induced in workmen on a Russian State farm by the inhalation of a seed-grain disinfectant consisting of copper carbonate with a small admixture of copper sulphate and traces of arsenic [cf. *R.A.M.*, vi, pp. 277, 475; vii, p. 624]. The apparatus used for treating the seed-grain (Neuhaus [ibid., v, p. 157] and Niloff 2 [ibid., xii, p. 617]) were defective in the fitting of the individual parts, with the result that the dust escaped in a cloud. For the protection of the workmen special seed disinfection rooms with adequate ventilation, hermetically sealing machines, and dust-proof transport sacks are advocated.

Tu (C.). **Physiologic forms of Puccinia graminis tritici in Kwangtung, Southern China.**—*Phytopath.*, xxiv, 4, pp. 423–424, 1934.

Six physiologic forms of *Puccinia graminis tritici* have been found by inoculation experiments on Stakman's and Levine's twelve differential wheat varieties [*R.A.M.*, ii, p. 158] to exist in Kwangtung Province, Southern China. Two of the forms correspond with 15 and 9, respectively, as described by the above-mentioned writers, while the remaining four appear to be new, and in Stakman's and Levine's latest key (mimeographed) are designated 132–5, inclusive.

Gassner (G.) & Franke (W.). **Der Stickstoffhaushalt junger Weizenpflanzen in seiner Abhängigkeit von der Mineralsalzernährung. Ein Beitrag zum Problem der Rostresistenz.** [The nitrogen economy of young Wheat plants in relation to mineral salt nutrition. A contribution to the rust resistance problem.]—*Phytopath. Zeitschr.*, vii, 2, pp. 187–222, 1 diag., 8 graphs, 1934.

It was impossible to ascertain by chemical analysis the parts played, respectively, by alterations in the protein content and in

the soluble nitrogen compounds, respectively, in wheat (two Squareheads and Malakoff) receiving different proportions of a complete fertilizer in regard to the reaction of the leaves to form XIV of *Puccinia triticina* [*R.A.M.*, xi, p. 98; xii, p. 274; xiii, p. 429]. The quantity of nitrogen was further found to afford no clue to varietal reaction to brown rust, which appears to depend rather on quantitative variations within the albumin groups. It is assumed that a given rust form is capable of assimilating only certain definite and specific 'albumin units', the percentage of which in the proteins of any one variety is constant and unaffected by external factors. It is obvious, therefore, that the greatest effect on rust resistance of alterations in albumin economy as a result of variations in the fertilizing scheme should be found (as the authors have, in practice, found) among semi-resistant wheats, the immune and highly resistant strains having too little, and the very susceptible types too much of this specific substance to be materially affected by alterations in the total proteins caused by fertilizers.

Becker (Hanna). **Zur Immunitätszüchtung des Weizens gegen Puccinia glumarum und Puccinia triticina.** [On the breeding of Wheat for immunity from *Puccinia glumarum* and *Puccinia triticina*.]—*Kühn-Arch.*, xxxviii, pp. 293–305, 1933.

A tabulated summary is given of the methods and results of experiments at the Halle Agricultural Institute in the breeding of wheat for freedom from yellow and brown rusts (*Puccinia glumarum* and *P. triticina*). Much of the work referred to has already been noticed in this *Review*. On the basis of recent studies by the writer five additional physiologic forms of *P. glumarum* are distinguished (15 to 19). For breeding purposes the five forms used at Halle are 1, 4, 7, 8 [*R.A.M.*, xiii, p. 429], and 18 (from Danzig), the last-named being identical with that from Neukirch [ibid., ix, p. 514]. None of the winter wheats except Chinese 165 and 166 gave any evidence of resistance to these forms, whereas among the summer varieties five were resistant to all the forms except 1. Systematic hybridization experiments showed that the inheritance of resistance is not consistently recessive or dominant nor governed by a certain number of factors, but varies with the original parent species and with the partner in the cross [ibid., xiii, p. 318]. Resistance in the summer wheats is recessive, due to a single factor, and in Chinese 166 it is dominant, due apparently to two factors. Selection for resistance among the summer wheat hybrids should be made in the F_2 generation, at which stage consistently resistant types have already developed, whereas in the Chinese crosses the work is best postponed until subsequent generations when the homozygotic, dominant types have accumulated.

Sutherland (J. L.) & Jodon (N. E.). **Resistance of Wheat varieties to bunt at Moccasin, Montana, and North Platte, Nebraska.**—*Journ. Amer. Soc. Agron.*, xxvi, 4, pp. 296–306, 1934.

A tabulated account is given of trials of the reaction to bunt

(*Tilletia levis* and *T. tritici*) [*T. fœtens* and *T. caries*] of a number of wheat varieties, the work having been in progress for four years at North Platte, Nebraska, and for six at Moccasin, Montana. A considerable number of varieties and strains gave promise of high resistance to the disease, 26 out of the 42 grown at both stations as well as 7 others at Moccasin and 34 at North Platte being superior in this respect to Nebraska No. 60. Minturki, a resistant variety grown commercially in the Great Plains, was surpassed in resistance by ten varieties at Moccasin and twelve at North Platte. At the latter station, Albit and Turkey selection (C. I. 10016) were the only varieties entirely free from bunt while at Moccasin none was completely immune. Deserving of special mention among the newer varieties are Ridit [*R.A.M.*, xiii, p. 86], Cooperatorka [ibid., xii, p. 559], Oro, Turkey selection (C. I. 10015 and 10016), Yogo, and Rio, while earlier information as to the high resistance of Hussar, Martin, and Sherman was confirmed [ibid., xii, p. 429; xiii, p. 20]. The data obtained in these experiments are stated to afford little or no evidence of the occurrence of different forms of bunt at the two stations or of any appreciable variations in the results from year to year.

Nattrass (R. M.). **Diseases of cereals. II. The flag or leaf smut of Wheat.**—*Cyprus Agric. Journ.*, xxix, 1, pp. 9–13, 2 figs., 1934.

Flag smut of wheat (*Urocystis tritici*), first recorded in Cyprus in 1931 [*R.A.M.*, xi, p. 695], though probably present for many years previously, is now widely distributed throughout the island, where none of the local varieties appears to be resistant. Two resistant Australian varieties, Nalawa and Geeralying, are being propagated at the central experimental farm and it is hoped that seed will eventually be available for distribution. A popular account of the symptoms and control of the disease is given.

Foëx (E.) & Rosella (E.). **Etude sur les pietins des céréales.** [A study on the foot rots of cereals.]—*Comptes rendus Acad. d'Agric. de France*, xx, 13, pp. 480–483, 1934.

In this paper (to which a foreword (pp. 479–480) is contributed by E. Roux), the writers enumerate the Gramineae contracting infection as a result of inoculation with *Cercosporella herpotrichoides*, *Ophiobolus graminis*, *O. herpotrichus*, *Leptosphaeria herpotrichoides*, and *Wojnowicia graminis*, the agents of cereal foot rots in France [*R.A.M.*, xii, p. 685].

C. herpotrichoides attacked all the wheats (representing the bulk of the cultivated species) used in the trials, two-, four-, and six-rowed barley, oats (*Avena sativa*, *A. orientalis semi-nuda*, and *A. nuda*), and Broekema rye, the oats and rye being very slightly affected.

O. graminis also infected all the species of wheat, barley, rye, and oats included in the tests, the last-named again suffering very slightly. A similar observation with regard to the resistance of oats to *O. graminis* was made in April, 1933, near Camp Marchand, Morocco, where this crop remained practically immune in the midst of devastated fields. Infection by *O. graminis* was further

secured on *Aegilops* spp., *Lolium perenne*, *Phleum pratense*, and *Festuca pratensis*. while mild symptoms were also observed on *Avena elatior* [*Arrhenatherum elatius*], *L. italicum*, and *Dactylis glomerata*. In supplementary greenhouse tests with *O. graminis* a very early Caucasian variety of *Setaria germanica* [*S. italica*] developed lodging and *Panicum italicum* a few lesions on the roots. The fungus was found to occur as a saprophyte on old sorghum sheaths, which may possibly serve to perpetuate it through the winter.

W. graminis caused very slight infection of wheat (*T. sativum* and *T. polonicum*) sheaths, while *L. herpotrichoides* and *O. herpotrichus* failed to attack any of the experimental plants, possibly owing to a diminution of virulence since their collection in 1928.

Bockmann (H.). **Fusskrankheiten—eine Folge verstärkten Weizenanbaues.** [Foot rots—a sequel to intensified Wheat cultivation.]—*Mitt. für die Landw.* (formerly *Mitt. Deutsch. Landw.- Gesellsch.*), xlix, 17, pp. 365–366, 1934.

The cultural and environmental factors governing the occurrence of blackleg (chiefly *Ophiobolus graminis*) and lodging (primarily *Cercosporella herpotrichoides* and *Fusarium culmorum*), collectively known as foot rot, on wheat in Germany are summarized [*R.A.M.*, xiii, p. 432].

In the Kiel district *C. herpotrichoides* has been observed to form conidia regularly on the diseased stubble and dead leaves on the surface of the ground during the winter. It was experimentally ascertained that in wet weather these spores can germinate on young wheat plants at a temperature of 0° C. and infection can take place up to 15°.

Shands (H. L.). **Temperature studies on stripe of Barley.**—*Phytopath.*, xxiv, 4, pp. 364–383, 1 fig., 1 graph, 1934.

The optimum temperature for the mycelial growth of five strains of *Helminthosporium gramineum* (four from the United States and one from Russia) on potato-dextrose agar was found to be near 25° C., with a maximum above 32° and a minimum below 8°.

Floral inoculations were made by spraying a conidial suspension of the fungus on barley flowers that had been enclosed in glassine bags about the time of the emergence of the head from the uppermost leaf sheath, while the seed was infected (*a*) by placing it between layers of medium on which the fungus was growing, and (*b*) incubating seed after contact with the mycelium growing on steam-sterilized wheat kernels [cf. *R.A.M.*, xii, p. 162].

Several types of stripe reaction developed under the influence of different inoculation methods, different cultures of the fungus, and different host varieties at constant air and soil temperatures. Generally speaking, the highest incidence of stripe took place at the lower temperatures (12° to 16°), but under these conditions the symptoms required longer for their development than at higher temperatures (20° to 24°). Change of temperature from low to high or vice versa in the early stages of growth of barley and stripe infection noticeably affected the development both of the plants and of the disease when the seed was inoculated with

mycelium, the change from low to high stimulating the appearance of the symptoms while the converse retarded it. In incubation tests of four days at various temperatures followed by transference to 16°, the highest percentage of infection (71·5) occurred at 20°. In another experiment, at the lower temperatures the inoculated seedlings required longer to reach the same stage of development as those at higher temperatures (15 days at 8° and 4 at 28°) and after transference to the greenhouse at 16° the highest disease percentage (average 88·8) developed in those incubated at the lowest temperature [cf. ibid., viii, pp. 372, 530].

NEILL (J. C.). **Experiments on control of some cereal diseases by seed-dusting. I. The control of Oat-smut. II. The control of Barley diseases.**—*New Zealand Journ. of Agric.*, xlviii, 4, pp. 234–237, 1934.

The tabulated results of experiments made at the Plant Research Station, Palmerston North, showed that dusting oats seed-grain (36 pure lines of which, belonging to seven different varieties, were tested) with copper carbonate or copper oxychloride was not effective in preventing the development of oat smuts (*Ustilago levis* [*U. kolleri*] and *U. avenae*) in the subsequent crop. Ceresan and ceresan new dusts gave almost perfect control and slightly increased the number of established plants, and agrosan G. gave even better stands but was not quite as effective in the control of the smuts.

In another series of tests, it was shown that loose smut of barley [*U. nuda*] was completely controlled only by the hot water treatment of the seed-grain, although all the dusts tested somewhat reduced the disease in the ensuing crops. Complete control of covered smut [*U. hordei*], and nearly complete control of stripe [*Helminthosporium gramineum*] were afforded by the organic mercury dusts ceresan, ceresan new, and agrosan G., while copper carbonate and copper oxychloride only reduced the incidence of these diseases.

STANTON (T. R.), COFFMAN (F. A.), & TAPKE (V. F.). **Field studies on resistance of hybrid selections of Oats to covered and loose smuts.**—*U.S. Dept. of Agric. Tech. Bull.* 422, 10 pp., 1934.

After pointing out that in the United States the annual loss from oat smut (*Ustilago levis* [*U. kolleri*] and *U. avenae*) [*R.A.M.*, xiii, p. 434] amounts to approximately 45,000,000 bushels, the authors state that when crosses between the almost immune Markton oat and leading commercial varieties were grown from artificially contaminated seed, the susceptible hybrids being weeded out in each successive generation, smutted plants still occurred in some of the F_5 generation. Several promising hybrids, however, were obtained from crosses combining the resistance of the Markton variety with the desirable characters of the susceptible parent. When two hundred selections isolated from C.I. 357, from which Markton originated, were tested over a period of two years for resistance to covered smut [*U. kolleri*] 156 lines became infected and only a few showed a resistance approximately equal to Markton ; there was also considerable morphological variation

showing that C.I. 357 is a mixture of strains. The highly resistant strains isolated from the mixture were similar to Markton in plant and kernel characters, the preponderance of selections of this type indicating that Markton probably represents the dominant morphological form of the original mass strain.

STOREY (H. H.). **Studies on the mechanism of the transmission of plant viruses by insects.**—*Arch. für Exper. Zellforsch.*, xv, 2–4, pp. 457–458, 1934.

This is a condensed version of the writer's account of his studies on the mechanism of the transmission of the maize streak virus by the leaf-hoppers *Cicadulina mbila* and *C. zeae*, which has already been noticed from another source [*R.A.M.*, xii, p. 686].

STEVENS (N. E.). **United States of America: bacterial wilt of Maize.**—*Internat. Bull. of Plant Protect.*, viii, 4, pp. 74–77, 1934.

Bacterial wilt of maize (*Aplanobacter stewarti*) [*R.A.M.*, xiii, p. 390] was again very severe on the sweet varieties in the United States in 1933, when its range was extended to Maine and New Hampshire in the extreme north-east. The severity of the disease also seems to be on the increase in field maize, losses ranging from 2 to 8 per cent. having been recorded in various States, but in certain important sweet corn-growing districts the average reductions of yield were lower in 1933 than in the previous year, partly at any rate owing to the replacement of the most susceptible varieties by more resistant strains and hybrids. Among the susceptible sweet corn varieties losses up to 100 per cent. were reported from Maine, Connecticut, and Pennsylvania, the average for the last-named State, however, being only 30 per cent. in 1933 compared with 45 in 1932.

SĂVULESCU (T.) & RAYSS (T.). **Putrezirea uscată a stiuleţilor de Porumb în România.** [Dry rot of Maize cobs in Rumania.]—*Ann. Inst. Recherches Agron. de Roumanie*, v, pp. 3–112, 34 figs., 6 graphs, 2 maps, 1933. [French summary. Received July, 1934.]

In a brief introduction to this paper the authors give an enumeration of the more important diseases of maize, among which the following are stated to have been recorded in Rumania: smut (*Ustilago zeae*), various rots caused by species of *Fusarium*, and more especially a root and foot rot caused by *F. culmorum* which was troublesome in 1933 in the valley of the Danube and in Dobrogea; rust (*Puccinia maydis*) which is not of economic importance; leaf spot caused by *Bacterium holci* [*R.A.M.*, xii, p. 165], which was also recorded on Sudan sorghum (*Sorghum exiguum*); yellow leaf spots caused by *Helminthosporium* spp.; and *Rhizoctonia bataticola* [*Macrophomina phaseoli*] on the roots and stem bases of maize [ibid., xi, p. 711].

The bulk of the paper is given to a full account of the authors' morphological, biological, cultural, and pathological studies of the dry rot of maize cobs due to *Nigrospora oryzae* [much of which has already been noticed from previous communications: ibid., xii,

p. 20]. The disease, which in 1929 was restricted to the valley of the Danube, has since spread over the whole region where Dent maize is cultivated. Comparative tests of varieties and pure lines of maize have shown considerable variations in susceptibility, ranging from high susceptibility in the Dinte de cal de Petroşani variety to high resistance in Cincantin. Varietal resistance has been found to depend on the following factors: an hereditary, apparently dominant, factor for resistance; the time of maturity of the variety, susceptibility increasing with lateness; the water content of the maize grains and especially of the rachis; and the degree of acidity of the cobs at the moment of infection. These factors appear to be governed to a large extent by environmental conditions, and are believed to be modifiable by appropriate cultural methods.

The control measures advocated include sowing resistant pure lines and varieties; the removal and destruction by fire of infected cobs; the use of grain from clean crops; and the disuse of stable manure from cattle fed with diseased maize. Mention is made of experiments in America which are said to have shown that the disease is amenable to control by seed disinfection with organic mercury compounds, which have given increases in yield ranging from 10 to 20 per cent.

Koehler (B.), Dungan (G. H.), & Burlison (W. L.). **Maturity of seed Corn in relation to yielding ability and disease infection.**—*Journ. Amer. Soc. Agron.*, xxvi, 4, pp. 262–274, 3 graphs, 1934.

Seed maize of the Reid Yellow Dent variety was selected and harvested at different stages of maturity ranging from about 20 days after fertilization (milk stage) until six weeks after maturity for a period of seven years at the Illinois Agricultural Experiment Station. Seed infections with *Fusarium moniliforme* [*Gibberella moniliformis*] and *Diplodia zeae* increased progressively up to maturity. *Cephalosporium acremonium* [*R.A.M.*, xiii, p. 160] was entirely absent from the first two groups selected, but appeared in those harvested later. Susceptibility to scutellum rot [ibid., x, p. 180] was highest (71·2 per cent.) in the milk stage, after which there was a progressive decline. Seed inoculation at planting time with five organisms capable of causing seedling diseases, viz., *Penicillium oxalicum* [loc. cit.], *G. saubinetii*, *Aspergillus niger*, *A. flavus*, and *P. notatum* [ibid., xiii, p. 459], produced the greatest damage in the immature stages. Ear rots (chiefly *D. zeae* and *G. moniliformis*) were apparently most severe in some seasons in plants raised from immature seed [cf. ibid., xiii, p. 218].

Mains (E. B.). **Host specialization of Puccinia sorghi.**—*Phytopath.*, xxiv, 4, pp. 405–411, 1934.

In a series of monosporidial cultures of *Puccinia sorghi* [*P. maydis*] on *Oxalis corniculata* made by exposing the plants to maize leaves bearing germinating teleutospores in a manner similar to that adopted by Craigie [*R.A.M.*, viii, p. 296], transference of a mixed pycnidial exudate resulted in 260 out of 290 monosporidial infections producing aecidia, while of the 342 in the untreated

series, only 29 formed these organs. Aecidia were produced even if the transfer of pycnospores was delayed, the thalli still being in a favourable condition for diploidization 34 days after infection. These results, agreeing with those of Cummins [ibid., x, p. 784], indicate that *P. maydis* is self-sterile.

O. corniculata was found to be the most favourable of the various plants tested for the production of the aecidial stage of *P. maydis*, *O. stricta* [ibid., xii, p. 388] and *O. cernua* only very occasionally giving a positive result. *O. europaea* reacted to two collections of the rust (from Indiana and Iowa, respectively), by abundant aecidial production but showed marked resistance to the remaining six and on the basis of its behaviour on this host, therefore, *P. maydis* may be divided into at least two races. The relationship of the physiologic forms of *P. maydis* distinguished by Mains in experiments on maize [ibid., xi, p. 170] to the races differentiated on *O. europaea* has not been fully investigated, but collection 2, to which this plant was susceptible, was found to correspond to form 3. Florida teosinte (*Euchlaena mexicana*) and maize were successfully inoculated with the aecidia of *P. maydis* from *O. corniculata*; negative results were given by tests with this inoculum, and also by uredospores collected on maize, on *Andropogon* spp. and various other grasses, whence it is concluded that the *A. furcatus—O. corniculata* rust described by Long (*Phytopath.*, ii, p. 164, 1912) belongs to *P. andropogonis* rather than to *P. maydis*.

Johnston (J. C.). **Experiments in mottle leaf control.**—*California Citrograph*, xix, 6, pp. 148, 159, 1934.

The 1932–3 season was particularly unfavourable for soil treatments against mottle leaf of citrus [*R.A.M.*, xiii, p. 504] in Tulare county, California, where the ring method of applying the materials to the soil in a narrow band round the base of the trunk has been found deleterious and has been discontinued. More injury resulted from zinc sulphate applications in sandy than in heavy soils, the chief drawback to the treatment being its unreliability and the results demonstrating that the safer the method the more uncertain was the control. The best results were obtained by using zinc sulphate in various spray combinations; individual leaf treatments with 5 lb. zinc sulphate in 100 galls. water and with 8 or 10 lb. of the same in 100 galls. of 2 or 4 per cent. lime-sulphur reduced the average amount of mottle leaf from 64·5 to 12·8 and from 44·5 to 2·5 per cent., respectively. Valencia oranges thus treated suffered no injury under conditions where zinc sulphate alone caused severe damage. With 10 lb. zinc sulphate plus 5 lb. hydrated lime in 100 galls. water no injury resulted, but the control obtained was poor, the corresponding reduction being only from 61·4 to 32·8 per cent. There was some evidence that spraying was more effective in autumn or spring than in summer.

Narasimhan (M. J.). **Oil Bordeaux mixture against koleroga of Arecanut.**—*Mysore Agric. Calendar 1934*, pp. 21, 25, 1934.

Areca [*Areca catechu*] palms in Mysore sprayed experimentally with Bordeaux mixture to which cheap local vegetable oils were

added as spreaders remained almost free from koleroga [*Phytophthora arecae*: *R.A.M.*, xiii, p. 77] though others in the same garden sprayed with casein Bordeaux mixture became affected. The mixture was made by adding $\frac{1}{8}$ gall. gingelly [*Sesamum indicum*], groundnut, or safflower [*Carthamus tinctorius*] oil to $12\frac{1}{2}$ galls. copper sulphate and slowly pouring the fluid (with the oil floating on the surface) into an equal volume of milk of lime, stirring vigorously.

Vegetable oils as spreaders for Bordeaux mixture.—*Mysore Coffee Exper. Stat. Circ.* 2, 3 pp., 1934.

When coffee in Mysore was sprayed with Bordeaux mixture to which cheap, locally obtainable, vegetable oils made from *Sesamum indicum*, groundnut, and *Pongamia glabra* were added as spreaders at the rate of 0·5 or 1 per cent. [see preceding abstract] the protection afforded against leaf disease [*Hemileia vastatrix*] compared favourably with that given by Bordeaux mixture plus resin-soda, casein, linseed oil, or alum, or by fish-oil-soap Burgundy mixture. On one estate, coffee sprayed with the cheap, vegetable-oil Bordeaux mixtures was only little affected by black rot [*Corticium koleroga*: *R.A.M.*, xii, pp. 435, 436] whereas the unsprayed controls were virulently attacked.

[This paper also appears in *Planters' Chronicle*, xxix, 11, pp. 265–266, 1934.]

Reynolds (E. B.) & Rea (H. E.). **Effect of fertilizers on the yield of Cotton and on the control of the root-rot disease of Cotton on the Blackland Prairie soils of Texas.**—*Journ. Amer. Soc. Agron.*, xxvi, 4, pp. 313–318, 1934.

Eighty-five co-operative fertilizer experiments on cotton [the results of which are tabulated] were conducted with farmers on the Blackland Prairie soils of Texas from 1930 to 1932 to determine the effect of the various treatments on yield and the incidence of root rot (*Phymatotrichum omnivorum*) [*R.A.M.*, xiii, p. 231]. Such increases of yield as were obtained were not of a profitable order, while none of the treatments produced any effect on root rot.

Toumanoff (C.). **Action des champignons entomophytes sur la pyrale du Maïs (Pyrausta nubilalis Hün).** [Action of entomogenous fungi on the European Corn borer (*Pyrausta nubilalis* Hün).]—*Ann. de Parasitol. Humaine et Comp.*, xi, 2, pp. 129–143, 3 pl., 1933.

An account is given of the author's studies of the mode of infection of the larvae of the European corn borer (*Pyrausta nubilalis*) with *Aspergillus flavus*, *Beauveria bassiana*, *B. globulifera*, and *Isaria farinosa* [cf. *R.A.M.*, xi, p. 180], the results of which showed that all these fungi readily infect the insects through their body integuments [see next abstract] and invade all the organs. Infection occurs somewhat more rapidly at atmospheric humidities near saturation point than between 46 and 70 per cent. High atmospheric humidities also favour the abundant production on the surface of the larvae of mycelium and conidia, and therefore the rapid transmission of the disease in nature. Temperature, on

the other hand, does not play any part in infection between 17° and 30° C., but temperatures between 8° and 12° appeared to delay infection in a certain measure. Rapid and prolonged cooling of the larvae after inoculation did not stimulate infection. Tests with *B. globulifera* and *B. bassiana* showed that the conidia were killed by exposure to direct sunlight for 2 and 3 hours, respectively, but the conidia of all the fungi were shown to preserve their viability in pure culture for a very considerable length of time.

LEFEBVRE (C. L.). **Penetration and development of the fungus, Beauveria bassiana, in the tissues of the Corn borer.**—*Ann. of Botany*, xlviii, 190, pp. 441–452, 1 pl., 2 figs., 1934.

A brief account is given of artificial inoculations of the European corn borer [*Pyrausta nubilalis*] with *Beauveria bassiana* [*R.A.M.*, xi, p. 299 and preceding abstract], by allowing them to crawl over a culture of the fungus and also by injecting them with a suspension of the spores. The examination of infected larvae showed that germinating spores on their surface produced infection hyphae which penetrated directly the thick sclerotized epidermal layer of the larvae at any point of the body, except the head, the same also applying to the thinner portions of the chitinous covering of the pupae. The study of larvae imported from Manchuria [loc. cit.] indicated that they had already been infected with the fungus in their original home, and gave definite indications that infection may also take place by way of the alimentary canal. After infection by either channel, the fungus first invaded the fat bodies, and then the glandular structures and ganglia, while the muscular tissue appeared to be the most resistant to invasion.

These results are considered to indicate that under favourable conditions *B. bassiana* can be a virulent parasite of the European corn borer. Owing to their initial infection with the fungus, Manchurian larvae do not seem to offer a suitable material for the introduction of insect parasites of the pest into the United States.

MASERA (E.). **Un fungo del genere Botrytis parassita degli insetti.** [A fungus of the genus *Botrytis* parasitic on insects.] —*Riv. di Biol.*, xvi, 2, pp. 266–272, 5 figs., 1934.

A species of *Botrytis*, characterized by septate hyphae and conidia, about 3 μ in diameter, borne on phialides, was isolated in 1931 and 1933 from dead silkworms (*Bombyx mori*) at the Padua Experiment Station. On potato at 25° C. a wine-coloured halo develops round the colony; profuse growth is made on agar and sericine-agar, on which the colour of the mycelium changes from white to yellowish on sporulation. Gelatine is rapidly liquefied. The fungus was found to be pathogenic to *Tenebrio molitor*.

FISH (F. F.). **A fungus disease in fishes in the Gulf of Maine**—*Parasitology*, xxvi, 1, pp. 1–16, 2 pl., 2 figs., 1934.

A fungous disease of epidemic proportions was found in the common sea herring (*Clupea harengus*) throughout the Gulf of Maine in 1931, the common winter flounder (*Pseudopleuronectes americanus*) and the alewife (*Pomobolus pseudoharengus*) being also involved but to a much lesser extent. The causal organism

was found to belong to the genus *Ichthyosporidium*, created by Caullery and Mesnil (*Arch. Zool. Expér.*, iv, p. 101, 1905), for two fish parasites, the specific name being tentatively accepted as *hoferi* Plehn and Mulsow (*Centralbl. für Bakt.*, Ab. 1, lix, p. 63, 1911); the genus *Ichthyophomus* established by the latter workers must be rejected, however, in favour of *Ichthyosporidium* on grounds of priority. The fungus is believed to be a normal parasite of the herring which occurs in an epidemic form only under the influence of certain unknown factors. It was found in herrings preserved in 1926, between which year and 1931 the disease appears to have increased steadily in intensity and subsequently declined.

The stage in which the parasite is most commonly encountered in the host is the so-called 'resting stage', represented by spherical, heavy-walled cells, 5 to 164·5 μ in diameter, containing nuclei averaging 2·2 to 2·5 μ but occasionally reaching 4 to 4·4 μ in diameter; in a single cell 125 μ in diameter there may be several hundred nuclei. The coenocytic, sparsely branched hyphae extending around these cells may attain a length of 20 or 25 times the diameter of the original spherical organism. The mycelium readily penetrates the surrounding tissue and eventually disintegrates into a large number of daughter cells, as described by Daniel (*Amer. Journ. of Hygiene*, xvii, p. 262, 1933).

The macroscopic and microscopic aspects of the lesions caused by *I. hoferi* are fully described. The herring is the only host known to show external signs of infection in the shape of the so-called 'black' or 'pepper' spots which in reality are merely holes in the bright, 'silvery' layer of the intact epidermis due to perforation by a subepidermal pus sac of necrotic tissue. Parasitic cysts, composed of fungus cells surrounded by epithelioid and connective tissue, occur throughout the internal organs both in the herring and the flounder, whereas in the alewife invasion seems to be restricted to the heart. The herring is believed to acquire infection by the ingestion of parasites liberated from fish in the same school, the flounder by the consumption of diseased herring, and the alewife by ingestion of the parasite during its occasional association with the herring. The fungus is thought to enter the host by way of the alimentary canal and thence to spread through the body in the blood stream or through the lymphatic system. It was grown successfully but very slowly at 20° C. on Henrici's routine medium alone or enriched with fish broth, Sabouraud's medium, and fish glycerine agar.

Bakst (H. J.), Hazard (J. B.), & Foley (J. A.). **Pulmonary moniliasis.**—*Journ. Amer. Med. Assoc.*, cii, 15, pp. 1208–1213, 3 figs., 1934.

A species of *Monilia*, characterized by single cells 4 to 12 μ in diameter, hyphae 1·5 to 2 μ in thickness, and oval conidia with a maximum diameter of 2 to 5 μ, was isolated from the sputa of three female patients suffering from pulmonary disturbances and is tentatively placed in group II of Stovall and Bubolz [*R.A.M.*, xii, p. 691]. In two out of the three cases the fungus was implicated as the primary agent of infection, and it is suggested that it

should receive consideration as one of the many potential agents in the wide group of ailments clinically known as 'chronic bronchitis' [ibid., xii, p. 692; cf. also xiii, p. 162].

Amstutz (O. C.). **Otomycosis: report of case.**—*Journ. Amer. Med. Assoc.*, cii, 19, p. 1562, 1934.

Clinical details are given of a case of otomycosis, associated with the presence in the meatus of *Aspergillus niger* [*R.A.M.*, xii, p. 631] and *Rhizopus nigricans*, in a young woman in a district of Ohio where the condition was previously unknown.

Catanei (A.). **Études sur les teignes.** [Studies on ringworms.] —*Arch. Inst. Pasteur d'Algérie*, xi, 3, pp. 267–399, 13 pl., 5 figs., 8 diags., 1933.

An exhaustive and fully documented account is given of the writer's epidemiological, clinical, parasitological, and experimental studies on human juvenile ringworms in Algeria, references to which have appeared from time to time in this *Review*.

The examination of 670 cultures from the scalps of children affected by trichophytosis in the three main divisions of the country, namely, Littoral Tellien, Hauts-Plateaux, and Sahara, indicated that 94 per cent. of the infection is due to *Trichophyton violaceum* and *T. glabrum* [*R.A.M.*, xii, p. 510], nine other species of this genus being occasionally involved. Two species of *Microsporon* were isolated, viz., *M. audouini* and *M. tardum*. Two strains of Sabouraud's *Microïde* group (*Ann. de Dermatol.*, Sér. 6, x, p. 236, 1929) were also obtained and are referred to *T. radiolatum* (*T. mentagrophytes*) [*R.A.M.*, xi, p. 373; xii, p. 695; xiii, p. 512].

Inoculation experiments were carried out on a number of domestic and laboratory animals and a study was made of the hitherto undescribed effects of the recently described *T. gourvili* [ibid., xii, p. 511] and *T. pruinosum*, as well as of the pathogenicity, not heretofore determined, of *T. glabrum*, *T. violaceum*, *T. langeroni* [ibid., xi, p. 576], and *T. soudanense*. Notes are given on the cultural and other characters of *Achorion schoenleini*.

Davidson (A. M.) & Gregory (P. H.). **In situ cultures of dermatophytes.**—*Canadian Journ. of Res.*, x, 4, pp. 373–393, 2 pl., 24 figs., 1934.

A comprehensive account is given of the writers' studies on the correlation between the morphology and certain phases of the life-cycle of four common fungi causing skin disease in man, viz., *Microsporon audouini*, *M. felineum* [*R.A.M.*, xiii, p. 96], *Trichophyton gypseum*, and *Achorion schoenleini*. It was found that in all cases the life cycle can be divided into a parasitic and saprophytic stage. Hairs naturally infected by the three first-named organisms and scutula containing the last were placed, without any nutrient medium, in van Tieghem cells at various humidities regulated by osmotic solutions of known vapour pressure. Under these conditions the above-mentioned dermatophytes were found

to undergo a second period of growth, resulting in the development of all the highly differentiated spore forms—aerial hyphae, aleuriospores, fuseaux, and spirals—hitherto known only in artificial cultures on various media. Morphologically these bodies differed sufficiently in the four organisms to permit the species to be distinguished from one another. It is suggested that the saprophytic phase, initiated in nature when the infected tissues fall from the body in a moist situation, may be of significance in the epidemiology of the dermatomycoses.

KAMBAYASHI (T.). **Über ein von einer Spezies der Malbranchea hervorgerufenes Hautleiden in China.** [On a skin disease produced by a species of *Malbranchea* in China.]—*Arch. für Dermatol.*, clxx, 1, pp. 97–106, 50 figs., 1934.

From the squamae of the nose and temporal region of a boy suffering from a trichophytoid skin eruption near Shanghai the writer isolated a species of the very rare genus *Malbranchea*, established by Saccardo in 1882 with the type species *M. pulchella* Sacc. et Penz., to which the sole addition hitherto has been *M. bolognesi-chiurcoi* Vuillemin [*R.A.M.*, vi, p. 483]. The present fungus differs both in clinical features and in certain morphological characters from the last-named despite a strong general resemblance, and is accordingly designated *M. kambayashii* n. sp. It is characterized on glucose agar by a profuse, compact mycelium composed of creeping, tortuous, branching, septate, hyaline hyphae, 2 to 3 μ in diameter; the conidia produced in chains from the apices of the semi-circularly curved conidiophores are hyaline, long-cylindrical, polygonal, and measure 3 to 5·5 by 2·5 to 4 μ. The fungus exerted a virulently pathogenic action on the internal organs of laboratory animals.

BERTACCINI (G.). **Contributo allo studio della cosidetta 'blastomicosi sud-Americana'.** [A contribution to the study of the so-called 'South American blastomycosis'.]—*Giorn. Ital. di Dermatol.*, lxxv, 2, pp. 783–828, 9 pl., 1934.

An exhaustive account is given of a fatal case of South American blastomycosis in a repatriated Italian emigrant, who contracted the disease in Brazil. The causal organism was extremely difficult to isolate from the lesions (which involved the cheeks, mouth, throat, middle ear, and brain). It was grown on various standard solid and liquid media by Prof. Redaelli, who diagnosed it as a new species of *Scopulariopsis* [cf. *R.A.M.*, xiii, p. 303], *S. bertaccini*. The fungus, which develops best between 22° and 26° C., is characterized in hanging drop cultures by straight, hyaline, septate, sterile hyphae, 3·5 to 4 μ in diameter; branched, tortuous, fertile hyphae, 1·5 to 3 μ in diameter, from which arise erect, clavate, hyaline conidiophores (phialides), 4 to 10 μ long, at the tips of which are abstricted singly or in chains of five or six, round to slightly oval, smooth, light brown conidia, 3·5 to 4 μ in diameter. Round or distorted intercalary and terminal chlamydospores, 20 to 25 μ in diameter, are also formed. Inoculation experiments with a conidial suspension of the new fungus gave positive results on guinea-pigs.

The taxonomic and clinical aspects of blastomycosis are fully discussed in the light of contemporary research.

Greaves (F. C.). **Coccidioidal granuloma with lesions in the small intestine.**—*U.S. Naval Med. Bull.*, xxxii, 2, pp. 201–204, 1934.

Oidium coccidioides [*Coccidioides immitis*: *R.A.M.*, xiii, p. 511] was isolated from lesions in the small intestine of a male negro who died as a result of the disease in 1933, this being apparently the first record of the occurrence of the fungus in the particular site under observation.

Ciferri (R.) & Redaelli (P.). **'Coccidioides immitis et Paracoccidioides brasiliensis' comme producteurs d'ammoniaque aux dépens des substances azotées.** [*Coccidioides immitis* and *Paracoccidioides brasiliensis* as producers of ammonia at the expense of nitrogenous materials.]—*Boll. Sez. Ital. della Soc. Internaz. Microbiol.*, vi, 4, pp. 126–128, 1934.

From the authors' studies of the nutritive requirements of *Coccidioides immitis* (strains Castellani and Weidman N. 1091) and *Paracoccidioides brasiliensis* (Splendore Almeida, strain Almeida N. 2) it is concluded that the former is a common saprophyte of the soil and vegetation, producing ammonia at the expense of proteids and able to infect human beings and domestic animals [see preceding abstract].

Sartory (A.), Sartory (R.), Meyer (J.), & Meyer (M.). **Deux cas d'ostéites dues, d'une part, au Sporotrichum gougeroti et, d'autre part, à une levure.** [Two cases of osteitis due, on the one hand, to *Sporotrichum gougeroti* and, on the other, to a yeast]—*Ann. Inst. Pasteur*, lii, 4, pp. 424–443, 9 figs., 1934.

A comprehensive account is given of the writers' clinical, morphological, and biochemical studies at Strasbourg on *Sporotrichum gougeroti* [*R.A.M.*, xii, p. 569] and a species of *Schizosaccharomyces*, each of which was responsible for a case of osteitis [cf. ibid., x, p. 106], the former involving the left tibiotarsal region in a young woman and the latter the left tibia in a 14-year-old girl.

Grimes (M.) & Hennerty (A. J.). **A study of the quantitative changes in the microbiological flora of sweet-cream salted butter of good keeping quality when held at 15° F. for a period of two to eight months.**—*Journ. Dairy Res.*, v, 2, pp. 137–143, 1934.

A fully tabulated account is given of the writers' researches at the Institute of Dairy Bacteriology, University College, Cork, on the quantitative changes in the microflora of sweet-cream salted butter stored at 15° F. for two to eight months. There was a marked increase in the yeast count, frequently without any corresponding impairment of the keeping quality of the samples, whereas the numbers of *Oidium* [*Oospora*] *lactis* [*R.A.M.*, xiii, p. 511] present tended to decrease progressively with the period of storage.

Loftus-Hills (G.), Scharp (L. R.), & Bellair (T.). **A study of factors influencing the keeping quality of some Victorian salted butters in cold storage.**—*Journ. Dairy Res.*, v, 2, pp. 124–136, 1 diag., 3 graphs, 1934.

The writers discuss and tabulate the results of their bacteriological and chemical examination at Melbourne of 70 boxes of salted butter stored at 12° F. for three months with a view to determining the factors controlling deterioration in the consignments destined for the English market. No positive correlation could be detected between the counts of bacteria, yeasts, and moulds and keeping quality [cf. preceding abstract], which appears to depend rather on the combined effects of copper content and acidity.

Henry (A. W.). **Observations on the variability of Polyspora lini.**—*Canadian Journ. of Res.*, x, 4, pp. 409–413, 2 pl., 1934.

Polyspora lini [*R.A.M.*, xi, p. 784], the agent of browning and stem-break of flax, was isolated from material procured from Ireland, Sweden, the United States, and Canada. Cultural differences in pigmentation and growth characters were observed between the various strains on potato dextrose, maize meal, and prune agars.

Most of the parent cultures produced saltants in the form of sectors, the Irish strain being particularly prolific in this respect. New strains differing from the parents and others in cultural characters originated in this manner and in many cases also produced sectors. Saltation was equally prevalent in mono- and polysporous strains. Most of the original isolations yielded a special form of the fungus characterized by the production on all the media tested of firm, tough colonies composed of abundant, densely packed mycelium and relatively sparse spore development, in contrast to the typical soft, loose, freely sporulating growth of the ordinary form. Strains of the new form of *P. lini* have arisen by saltation either as sectors or islands in colonies of the ordinary form, and so far they have shown no tendency towards reversion to the parental type even after long culture on artificial media or passage through the host.

Preliminary pathogenicity tests on the susceptible Bombay C.I. 42 and other Indian selections and the resistant Winona and Ottawa 770 B indicate that the same flax variety may differ in its reaction to the various strains of *P. lini*.

Bongini (Virginia). **Essiccamento anulare del fusto in piantoni dei vivai.** [Annular desiccation of the stem in nursery stock.]—*La Difesa delle Piante*, xi, 2, pp. 62–67, 1 fig., 1934.

The practice adopted in Piedmont during winter of protecting two- to four-year old *Sophora*, *Cytisus*, *Robinia*, and *Laurocerasus* [*Prunus*] plants from frost by packing soil round the base of the trunks to a height of some 70 cm. has been found to cause 40 per cent. or more of the plants to wilt during the following summer. A dry, yellow, depressed area forms on the trunk just below the top of the protective covering of soil, growth declines, and premature defoliation sets in. The lesion rapidly enlarges, and the

cortical and cambial tissues as well as the outer xylem ring dry up. The cortex becomes wrinkled and bears conidiophores and conidia of *Botrytis cinerea*, to which the condition is attributed. It is recommended that the covering of soil should be replaced by loose straw.

DRAYTON (F. L.). **The Gladiolus dry rot caused by Sclerotinia gladioli (Massey) n. comb.**—*Phytopath.*, xxiv, 4, pp. 397–404, 3 figs., 1934.

A complete technical diagnosis [in English] is given of *Sclerotinia gladioli* (Massey) n. comb. (syn. *Sclerotium gladioli*) based on apothecia obtained in culture as a result of fertilization, by the microconidia, of the receptive bodies as already reported [*R.A.M.*, xiii, p. 461]. The apothecia are densely caespitose, stipitate, 6 to 10 mm. high and 3 to 7 mm. broad, with a cinnamon-brown disk and chestnut-brown stipe (Ridgway); the hymenial surface is umbilicate, convex-discoid, the margin strongly reflexed, deeply crenate, sometimes entire or convolute, the lower surface tomentose, and the context thick, prosenchymatous, infundibuliform, with a definite hypothecium. The cylindrical to clavate asci, opening by a pore, measure 190·5 to 235·4 by 8·5 to 9·2 μ, average 212·5 by 9·06 μ, and contain eight unicellular, uniseriate, ellipsoidal, hyaline, uninucleate ascospores, 10·2 to 16·75 by 5·6 to 9·5 μ, average 14·04 by 7·25 μ, mode 13·5 by 7·25 μ. The paraphyses are abundant, filiform to slightly clavate at the apex, septate, hyaline, and measure 2·8 to 3·2 μ in diameter. The sclerotia and sexual elements are also described [loc. cit.]. The organism is known to occur in the United States, Canada, Great Britain, Holland, Germany, France, and New Zealand, causing dry rot of all cultivated varieties of *Gladiolus* and also affecting species of *Tritonia*, *Freesia*, *Lapeyrousia*, and *Crocus*.

HARRIS (M. R.). **A Phytophthora disease of Snapdragons.**—*Phytopath.*, xxiv, 4, pp. 412–417, 1 fig., 1934.

This is an expanded account of the author's study [*R.A.M.*, xiii, p. 31] on a wilt disease which attacked Roman Gold, Jenny Schneider, and Cheviot Maid snapdragons [*Antirrhinum majus*] in the San Leandro greenhouses, California, in 1932 and to which the first-named variety was particularly susceptible, over 75 per cent. of the plants being destroyed. The morphological characters of the *Phytophthora* responsible for the disease, consisting of terminal, ovate, papillate, pale yellow conidia, 30 to 45 by 20 to 25 μ, semi-spherical antheridia, spherical oogonia, and numerous oospores, indicate that it is closely allied to, if not identical with, *P. cactorum*.

Histological investigations showed that the epidermis was the first tissue to be invaded, after which the fungus rapidly traversed the cortex and phloem tissue, reached the cambium, and eventually made its way into the xylem, chiefly along the medullary rays. The progress of the organism was accompanied by the collapse into a brown, shapeless mass of all the cells except those in the xylem.

Infection was traced to the compost pile from which soil was taken at transplanting time, and complete elimination was achieved by half-an-hour's exposure to a steam pressure of 10 lb. in an autoclave.

Wilkins (F. S.) & Westover (H. L.). **Turkestan Alfalfa as compared with Grimm for wilt-infected soils in Iowa.**—*Journ. Amer. Soc. Agron.*, xxvi, 3, pp. 213–222, 1934.

Of some 500 lots of lucerne used in yield trials since 1926 at the Iowa Agricultural Experiment Station, only the Turkestan, Hardistan, and Ladak varieties showed marked resistance to bacterial wilt (*Phytomonas insidiosa*) [*Aplanobacter insidiosum*: *R.A.M.*, xiii, p. 151]. The first-named, however, is particularly susceptible to leaf diseases which frequently cause drying and shedding of a considerable proportion of the foliage before harvesting. The three above-mentioned varieties can all be recommended for long rotations on wilt-infected soils, while Cossack, Grimm, Dakota, or Montana Common may be used in short sequences.

Faes (H.), Staehelin (M.), & Bovey (P.). **La lutte contre les ennemis des arbres fruitiers, insectes et champignons en 1932.** [The campaign against the insect and fungous pests of fruit trees in 1932.]—*Landw. Jahrb. der Schweiz*, xlviii, 3, pp. 241–280, 1 col. pl., 8 figs., 1934. [German summary.]

The results [which are fully discussed and tabulated] of experiments in the control of apple and pear scab (*Venturia inaequalis* and *V. pirina*) in the cantons of Vaud and Valais, Switzerland, in 1932 [cf. *R.A.M.*, xii, p. 450] clearly demonstrated the value of the pre-blossom application. In wet summers two post-blossom treatments, one after petal-fall and another 15 to 20 days later, are inadequate and should be supplemented by at least one more in July, while a further application in August is recommended against late scab on the fruits. There is no doubt as to the superiority, from a fungicidal standpoint, of Bordeaux mixture over lime-sulphur, but in view of the serious damage liable to be inflicted by the former on apple leaves and fruits, the latter should be substituted for the two first post-blossom treatments, while for late applications cupro-Maag (150 to 200 gm. in 100 l. water) or a similar copper-containing product may be used [ibid., xiii, p. 171].

In 1929–30 Pomme d'Api apples stored in peat were less severely affected by scald than those enclosed in paraffined wraps [ibid., xi, p. 659], while the untreated fruit showed the highest incidence of the disorder.

Two to three applications of 1 per cent. Bordeaux mixture or 2 per cent. lime-sulphur gave good control of shot hole of cherries (*Clasterosporium*) [*carpophilum*], which was also effectively combated on peaches by the latter preparation at 1 per cent. and on apricots by four applications of 1 per cent. Bordeaux mixture.

Heavy damage was caused on cherry trees in different parts of Switzerland in 1932 by *Valsa leucostoma* [ibid., xiii, p. 183], possibly as a sequel to the very severe winter of 1928–9, when wounds and cracks developed in the bark and afforded entrance to the

spores. The branches in the upper part of the crown were shrivelled and destroyed by the fungus.

Control of orchard diseases and pests by spraying.—*New Zealand Journ. of Agric.*, xlviii, 4, pp. 209–217, 1 fig., 1934.

Recommendations are made, based on recent experimental data obtained in New Zealand, for the preparation and application of the principal spray fluids commercially used for the control of parasitic diseases and insect pests of orchard trees in the Dominion. Spray schedules are also given for pome and stone fruit trees.

CARTER (F. M.). **Investigation of factors affecting advance of certain 'Apple-spot' fungi within the host tissue.**—*Ann. of Botany*, xlviii, 190, pp. 363–394, 19 graphs, 1934.

This is a detailed account of the author's investigation, by methods identical with those used by Seth [*R.A.M.*, xiii, p. 524], of the chemical factors which affect the advance within the host tissues of apple-spotting fungi, as represented by *Pleospora herbarum*, *Polyopeus* sp., *P. purpureus*, *Alternaria* sp., *A. tenuis*, and *Fusarium* [*lateritium* var.] *fructigenum* strains A and D [ibid., xi, p. 52; xii, p. 184]. The results are presented in the form of tables and of curves obtained by plotting the radial spread of the fungi against varying concentrations and combinations in the standard medium of malic acid, glucose, sucrose, fructose, and nitrogen. It was shown that all the fungi tested spread very slowly in media containing over 0·4 per cent. malic acid, a fact which may probably explain the greater prevalence of fungal spotting in sweet than in sour varieties of apple. Within the limits of the tests, the rate of spread was not greatly affected by changes in the concentration of sugar or by the substitution of sucrose for glucose. The substitution of fructose for glucose had little effect on the spread of *Pleospora*, but favoured spread in *F. lateritium* var. *fructigenum* D and *Alternaria* spp. In *F. lateritium* var. *fructigenum* A it favoured spread at relatively low concentrations of malic acid, and retarded it at higher concentrations. No growth of any of the fungi was observed in media containing 0·3 per cent. malic acid combined with 9 per cent. fructose, indicating that fructose is partly responsible for the change in the order of attacking power of the two strains of *F. lateritium* var. *fructigenum* previously recorded as associated with increasing age of fruit [loc. cit.].

In all the fungi studied, in the absence of acid from the media, the curves representing the relationship between radial growth in nine days and nitrogen content tended to rise to a maximum at a nitrogen content little over zero, and then fell as the concentration increased, but in the presence of acid the fungi varied more widely in their response to nitrogen content. With the two strains of *F. lateritium* var. *fructigenum*, in particular, a change from 0·15 to 0·3 per cent. malic acid in the medium resulted in a reversal of the relationship between radial spread and nitrogen concentration for values ranging from 0·01 to 0·03 per cent. nitrogen. This would suggest that in apples of low acid content, the usual relationship

between radial advance of the fungus and nitrogen content of the fruit may possibly be reversed.

ZORN (R.). **Eine eigentümliche Krankheits-Erscheinung an Apfel-Pyramiden.** [A peculiar pathological manifestation on Apple pyramids.]—*Obst- und Gemüsebau*, lxxx, 5, p. 76, 2 figs. (1 on p. 77), 1934.

For some years past the writer's 14 Peter Heusgen's Gold Pippin apple pyramids, grafted in 1908 at the age of five years on Paradise stocks, have manifested peculiar warty excrescences which are gradually extending from the older to the younger parts and afford a suitable basis for the attacks of the canker fungus [*Nectria galligena*: *R.A.M.*, xiii, p. 523]. Possibly the fact that the scion comes into leaf much later than the stock variety may be concerned in this unusual development.

In an editorial note it is stated that the gnarled outgrowths in question are attributed by the Biological Institute to abnormal bud formation in the cambial region, possibly arising out of incompatibility between stock and scion.

ATANASOFF (D.). **Is bitter pit of Apples a virus disease?**—*Phytopath. Zeitschr.*, vii, 2, pp. 145–168, 9 figs., 1934.

This paper on the etiology of bitter pit of apples has already been noticed from another source [*R.A.M.*, xiii, p. 169].

CARNE (W. M.). **Wastage in Tasmanian Apples held for mainland markets.**—*Fruit World of Australasia*, xxxv, 4, pp. 195, 197, 1934.

In recent years the keeping quality of apples held in cool storage in Tasmania while awaiting shipment to the mainland of Australia has shown a general decline, chiefly owing to low temperature breakdown [*R.A.M.*, xii, pp. 35, 573] to which Cox's Orange Pippin, Sturmer, Scarlet, Jonathan, French Crab, and Ribston are locally the most susceptible varieties. The increase in this disorder may be due to heavier fertilizing and later picking.

To reduce the loss from this cause to a minimum, fruit from trees carrying apples which are, on the average, larger than the apples on trees with good crops should not be placed in cool storage, as large fruit are much the most susceptible to this type of injury. Jonathan and Scarlet should be picked when the 'ground' colour (i.e. the colour of the parts that are not red or flushed) is light green, Sturmer when it is changing from full to light green, and French Crab when the original green shows the first evidence of becoming lighter. Susceptible varieties should be stored at 35° to 36° F. or as near to this temperature as possible.

BURGERT (IRMA A.). **Some factors influencing germination of spores of Phyllosticta solitaria.**—*Phytopath.*, xxiv, 4, pp. 384–396, 1934.

This is an extended account of the writer's studies on the factors affecting sporulation in *Phyllosticta solitaria*, a condensed version of which has already been noticed [*R.A.M.*, xiii, p. 450].

NEUMANN (H.). **Birnenfäule, hervorgerufen durch Phytophthora cactorum Schroet.** [Pear rot caused by *Phytophthora cactorum* Schroet.]—*Obst, 1933*, pp. 257–258, 2 figs., 1933. [Abs. in *Bot. Centralbl.*, N.F., xxiv, 11–12, p. 384, 1934.]

The occurrence of *Phytophthora cactorum* on pears is reported, apparently for the first time in Austria [cf. *R.A.M.*, ix, p. 392 ; x, p. 214]. Weather conditions during the growing period are believed to have favoured the outbreak.

WAYNICK (MINERVA). **A rot of Pear caused by the red bread-mould fungus.**—*Journ. Elisha Mitchell Sci. Soc.*, xlix, 2, pp. 285–288, 2 figs., 1934.

In a study of a soft rot of pears (purchased in North Carolina) caused by the conidial form of a fungus identified by Dodge as sex B of his monilioid, pigmented form of the red bread-mould fungus, *Neurospora sitophila* [*R.A.M.*, xii, p. 625 ; xiii, p. 7], pears were inoculated with hyphae and conidia, some being stored at 20° C. and others at 35°. Two or three days later brown, decayed areas developed round the points of inoculation. Examination of the diseased tissues showed that the infected pulp cells remained intact as they separated and that the mycelium was intercellular. The hyphae passed between the parenchyma cells and were so abundant as to enclose them, but there was no evidence of intracellular invasion. The middle lamella was dissolved slightly in advance of the invading hyphae. In culture, using soluble starch in starch agar as the only nutrient, the fungus grew sparsely, and there was no evidence (as shown with iodine) that in cultures one week old any appreciable amount of starch had been utilized. Potato agar, however, supported a luxuriant growth. Acid formed in 1 per cent. dextrose and in 1 per cent. sucrose agar when the initial reaction was alkaline, indicating that each can serve as a food for the mould. Pectin was not utilized in any quantity. Examination of the affected tissues clearly showed that the primary membranes (calcium pectate) of the pulp cells serve as a food for the fungus ; presumably, protopectins and some of their cleavage products can also be utilized.

BARTHELET (J.). **Sur une pourriture des fruits à pépins Phacidiella discolor (Mout. et Sacc.) Poteb.** [On a decay of kernel fruits, *Phacidiella discolor* (Mout. et Sacc.) Poteb.]—*Bull. Soc. Nat. Hort. de France*, Sér. 6, i, pp. 162–163, 1934.

Phacidiella discolor [*R.A.M.*, xii, p. 8] was observed in 1932 for the first time in France, causing a dry, black rot of pear fruits, which were attacked in their upper part. Sections through diseased fruits revealed a greyish-brown discoloration of the flesh which assumed a black tinge near the point of insertion of the pedicel. The fungus has been reported on pears and apples from Russia, Switzerland, Belgium, Denmark, Norway, and England ; the perfect stage occurs only on the branches, the fruits bearing the greenish-grey pycnidia of *Phacidiopycnis malorum*. The organism is of purely secondary importance, except possibly on stored fruit.

CURZI (M.). **Lo 'Stereum purpureum' Pers. nel mal del piombo in Italia.** [*Stereum purpureum* Pers. in silver leaf disease in Italy.]—*Boll. R. Staz. Pat. Veg.*, N.S., xiv, 1, pp. 117–124, 1 pl., 3 figs., 1934. [English summary.]

In January, 1934, Regina Claudia Grande plums growing near Rome and affected with silver leaf for some five or seven years showed at the base of the trunks abundant fructifications of *Stereum purpureum* [*R.A.M.*, xiii, p. 385]. The hymenium was deep purple and the basidiospores measured 5·5 to 7 by 2·5 to 3·25 μ. This is the first record of the fructifications of *S. purpureum* on trees affected with silver leaf in Italy, their development in this instance being favoured by prevailing wet weather and the particular condition of the trees. It is thought that infection takes place through pruning wounds and chiefly during the winter when the fungus is able to sporulate.

REINKING (O. A.). **The distribution of Banana wilt.**—*Philipp. Journ. of Sci.*, liii, 3, pp. 229–243, 5 pl., 1934.

Banana wilt was found, during the writer's investigations from 1925–7, to occur in the Philippine Islands, Straits Settlements, Federated Malay States, Siam, Dutch East Indies, Australia, Burma, and India, and *Fusarium* [*oxysporum*] *cubense* [*R.A.M.*, xiii, pp. 251–2] isolated in every case from the diseased plants.

In Malaya the Embun variety (the ordinary Gros Michel of commerce) is widely and severely attacked, also Awak and Rastali (Manzana or Apple); in Siam the common Nam Wa (a type resembling Awak) is affected; in Java Ambon poetih (Gros Michel), Radja sereh (similar to Apple, Manzana, or Latundan, the only variety attacked in the Philippines) [also found by Gäumann to be susceptible to *Pseudomonas musae*: ibid., i, p. 225], and Radja sijem (resembling Nam Wa); in Burma, Kala (Latundan type); and in India, Kabari (Awak) and Sonkel Chanda. Banana wilt appears to be widespread in the Dutch East Indies, having been observed on two of the Banda Islands in the Molucca group. The disease in Java [loc. cit.], from typical cases of which *F. oxysporum cubense* was consistently isolated, does not appear to differ in any respect from that occurring in other parts of the world. In the Dacca district of Bengal, infection was particularly severe in garden plantings that had been cultivated for years around the farmhouses.

CARTER (W.). **Mealy-bug wilt and green spot in Jamaica and Central America.**—*Phytopath.*, xxiv, 4, pp. 424-426, 1934.

During the autumn of 1932 the writer investigated the situation in respect of mealy bug (*Pseudococcus brevipes*) wilt and green spot of the pineapple in Jamaica, Guatemala, and Spanish Honduras [*R.A.M.*, xii, p. 521]. Mealy bug wilt appears to be present in Jamaica, where the disappearance of the Smooth Cayenne variety and the gradual decline of Red Ripley may be attributed to this cause. The Cheese or Sugar Pine, now widely cultivated on the island, is highly resistant to the disease. Green spot occurred in Jamaica on the Cheese Pine, Porto Rican, San Clarke, and Cowboy varieties. Neither wilt nor green spotting was observed in Guate-

mala notwithstanding the prevalence of the mealy bug in the lowlands on the predominant Cheese Pine. In Spanish Honduras green spotting was detected only in a garden of the United Fruit Company near Progresso, to which material had been transferred from Hawaii, and wilt was absent. [In line 4 of the abstract of the author's previous paper (ibid., xii, p. 520), 'though not necessarily' should be inserted before 'following their feeding on infected plants'.]

GIGANTE (R.). **Ricerche sulla morfologia, la biologia e la posizione sistematica del fungo che è stato descritto come 'Macrophoma dalmatica'.** [Researches on the morphology, biology, and systematic position of the fungus that has been described as *Macrophoma dalmatica*.]—*Boll. R. Staz. Pat. Veg.*, N.S., xiv, 1, pp. 125–172, 2 pl., 16 figs., 1934. [English summary.]

From olives growing in the vicinity of Rome and showing dark brown, depressed, circular or oval spots surrounded by a lighter raised margin the author isolated a *Sphaeropsis* which in culture on various media formed spherical or elliptical, ostiolate pycnidia, 125 to 275 (average 180) μ in diameter. The pycnospores measured 16 to 27 by 6 to 7 μ and were at first hyaline, thin-walled and able to germinate, thus presenting the characters of *Macrophoma dalmatica* [*R.A.M.*, xii, p. 707], but as they later turned brown and showed thickening of the walls they assumed the characters of a *Sphaeropsis*. It therefore appears that *M. dalmatica* is only an immature stage of the latter and the author accordingly renames it *S. dalmatica* (Thüm.) Gigante.

The hyaline and brown spores germinated in 1 per cent. glucose solution held at 25° C. after two to three and eight hours, respectively. Mercuric compounds at a concentration of 0·01 per cent. inhibited germination. The fungus grew better on neutral or acid than on alkaline media, inducing an alkaline reaction, and produced the hydrolytic enzymes amylase, pectinase, protease, lipase, and emulsin.

Inoculations of olives, pears, and apples with an aqueous suspension of the spores gave positive results only on wounded fruits.

WINKELMANN (A.). **Erprobte Mittel gegen Pilzkrankheiten.** [Tested methods against fungous diseases.]—*Biol. Reichsanst. für Land- und Forstw. Flugbl.* 74, 11 pp., 1934.

This is a compilation of the fungicides officially approved by the competent German authorities, arranged under the headings of seed disinfectants, spraying and dusting preparations, and soil disinfectants, with full directions for their use. A list of the principal fungous diseases with the various preparations effective in their control, together with brief recommendations for the application of the latter and of other sanitary measures, is appended.

BLODGETT (F. M.) & MADER (E. O.). **A method of recording the distribution of copper dusts or sprays on leaves.**—*Phytopath.*, xxiv, 4, pp. 418–422, 1 fig., 1934.

By pressing a moist paper treated with a solution of potassium ferrocyanide (2 gm. with 5 c.c. acetic acid in 100 c.c. water) on

potato leaves sprayed or dusted with copper compounds [against *Phytophthora infestans*] a brown precipitate is formed where reaction with the copper deposit takes place, which adheres to the paper in the form of spots corresponding in size and shape to those of the mixture on the leaf. After washing, the prints may be dried to form a permanent record. Using this method, it was found that the average gain in the percentage of leaf area covered by 400 lb. pressure (128 galls. per acre) was 38·3 ± 1·1 over 200 lb. (77 galls.), the average increase in yield being 36·5 bushels per acre.

Morstatt (H.). **Über die Frage der Zunahme der Pflanzenkrankheiten.** [On the question of the increase of plant diseases.]—*Mitt. Biol. Reichsanst. für Land- und Forstw.*, 48, pp. 63–72, 2 graphs, 1934.

The writer examines and discusses the current standpoint that epidemic plant diseases are on the increase in Germany [cf. *R.A.M.*, xii, p. 578]. The conclusion reached is that there has been no actual rise in the incidence of destructive endemic diseases of recent years, the contrary impression being based on such factors as improved methods of observation, intensified financial competition, and higher standards of quality. On the other hand, there is no doubt that German agriculture is jeopardized by the introduction of plant pathogens from foreign countries.

Smith (J. H.). **Remarks on the size of plant viruses.**—*Arch. für Exper. Zellforsch.*, xv, 2–4, pp. 454–456, 1934.

In connexion with a brief summary at the Cytological Congress held at Cambridge in August, 1933, of recent studies on the dimensions of some well-known plant and animal viruses, the writer concisely sums up the evidence for and against the 'living entity' theory of these organisms [*R.A.M.*, xiii, pp. 116, 475]. In his opinion the outcome of the investigations hitherto made on this problem does not justify the application to the viruses of the term 'living' in its ordinary connotation [see next abstract].

Bechhold (H.). **Enzyme oder Lebewesen?** [Ferment or living entity?]—*Kolloid Zeitschr.*, lxvi, 3, pp. 329–340; lxvii, 1, pp. 66–79, 4 graphs, 1934.

On the basis of studies conducted since 1930 by ultra-violet photography, ultrafiltration, and centrifuging on the dimensions of the ultra-microscopic agents of four human and animal diseases, six highly motile bacteriophages of various sizes between 90 and 20 $\mu\mu$, and tobacco mosaic [*R.A.M.*, xiii, p. 401], the writer concludes that the enzymatic conception of the viruses is no longer tenable, and that all the available evidence points to their inclusion within the ranks of living entities [see preceding and next abstracts].

Hoder (F.). **Der gegenwärtige Stand der Bakteriophagenforschung.** [The present status of bacteriophage research.]—*Arch. für Mikrobiol.*, iv, 4, pp. 589–635, 1933.

The writer enumerates and briefly discusses the principal contributions since 1917, with special reference to those of the last

four years, to the literature on the bacteriophage problem under the headings of (1) occurrence, origin, and properties, (2) diagnosis and therapy, and (3) action and nature of the bacteriophage. Considering the material as a whole, it is felt that no decisive conclusion can be reached as to the essential character of the bacteriophage on the basis of present knowledge. However, the complexity of the phenomenon has been amply demonstrated and d'Hérelle's conception of the bacteriophage as a living entity appears scarcely tenable in the light of recent studies [see preceding abstracts].

A five-page bibliography is appended.

Smith (K. M.). **The plant virus in the insect vector.**—*Arch. für Exper. Zellforsch.*, xv, 2–4, p. 459, 1934.

In a paper read before the Cytological Congress held at Cambridge in August, 1933, it was stated that three kinds of relationship exist between plant viruses and their insect vectors, namely, purely mechanical in which the virus is conveyed at random on the mouthparts; semi- or group-specific, as in the case of viruses spread exclusively by leafhoppers (Jassidae), whiteflies (Aleyrodidae), or thrips (Thysanoptera); and specific, in which a particular virus is transmissible exclusively by a single insect vector, e.g., aster yellows by *Cicadula sexnotata* [*R.A.M.*, xii, p. 446], curly top of sugar beet by *Eutettix tenella* [ibid., xiii, p. 285], and false blossom of cranberry by *Euscelis striatulus* [ibid., xiii, p. 249].

Strong presumptive evidence is available for the multiplication of the virus in the body of the insect vector, and the vectors of several diseases remain infective for long periods without renewed access to a source of infection. The duration of infectivity may be correlated to some extent with the length of time of feeding on diseased material and the amount of the virus ingested.

It is noteworthy that many of the insect-borne viruses are readily adsorbed by certain substances and very short-lived *in vitro*.

Loewenthal (H.). **The cultivation of animal and plant viruses.** —*Arch. für Exper. Zellforsch.*, xv, 2–4, pp. 403–404, 1934.

After a very brief résumé on the latest developments (since 1925) in the field of virus cultivation the author expresses the opinion that progress in the cultivation of plant, as opposed to animal, viruses has been delayed by the difficulty of finding a medium analogous to that made from blood plasma and extracts, and suggests that the use of some lately discovered growth-promoting substances might yield valuable results in this sphere.

Reed (H. S.) & Frémont (Mlle T.). **Les arbuscules des mycorhizes endotrophes.** [The arbuscles of endotrophic mycorrhiza.]—*Comptes rendus Soc. de Biol.*, cxvi, 18, pp. 201–202, 1934.

A cytological study was made in California of the arbuscles of the endotrophic mycorrhiza of citrus [*R.A.M.*, xii, p. 506]. On entering the host cell the lateral branch of the primary hypha immediately becomes enveloped by cytoplasm. From the host cell mitochondria and vacuolar elements migrate into the invading

mycelium in such a way that interpenetration between the plant and the endophyte is soon complete. The arbuscles thus arise from an almost perfect symbiotic relation between two living organisms. Ultimately they undergo atrophy and dissolution.

ROBERG (M.). **Über den Erreger der Wurzelknöllchen von Alnus und den Elaeagnaceen Elaeagnus und Hippophaë.** [On the agent of the root nodules of Alder and the Elaeagnaceae *Elaeagnus* and *Hippophaë*.]—*Jahrb. Wissensch. Bot.*, lxxix, 3, pp. 472–492, 1934.

A detailed, fully tabulated account is given of the writer's investigations at Münster University (Westphalia) on the etiology of the root nodules (rhizothamnia) of alder (*Alnus glutinosa*), *Elaeagnus* spp., and *Hippophaë rhamnoides* [*R.A.M.*, xii, p. 649]. Of the 600 seedlings grown in water cultures, gravel, or soil, 400 were inoculated with macerated root nodules from the various hosts under observation. The water-culture plants were grown from seed germinated in a nutrient solution containing nitrogen, transplanted to a nitrogen-free medium when 2 to 5 cm. high, and then inoculated, those grown in sand being similarly treated except for transplanting into sterilized sand. In the soil cultures a number of unsterilized soils were tested for the presence of organisms capable of producing the nodules, with positive results in several cases.

Root nodules were found to be produced in alder, *Elaeagnus* spp., and *H. rhamnoides* by two different organisms temporarily designated *Actinomyces alni* and *A. elaeagni* but without a description. Alders developed rhizothamnia only as a sequel to infection by *A. alni*, which had no effect on the other two plants, while *A. elaeagni* was capable of producing root nodules in *E.* spp. and *H. rhamnoides* but not in *Alnus glutinosa*. Elementary atmospheric nitrogen is fixed by alders, *E.* spp., and *H. rhamnoides* with the aid of their symbionts. The latter, however, were shown not to be essential for the growth of the hosts, which flourished equally well without inoculation provided nitrates were supplied in sufficient quantities. In contrast to Virtanen's observations on Leguminosae and alders in sand (*Ann. Acad. Fenn.*, Ser. A, xxxvi, 12; *Biochem. Zeitschr.*, cclviii, p. 106; *Act. Chem. Fenn.*, B, vi, 1933), the writer detected no diffusion of organically fixed nitrogen from the root nodules of the test plants into the surrounding liquid in water cultures, but this discrepancy may be partially attributable to differences in experimental conditions.

BERKNER [F.]. **Eisenfleckigkeit bei Kartoffeln. Wesentliche Sortenunterschiede — Abhängigkeit der Befallstärke von Jahreswitterung und Boden.** ['Eisenfleckigkeit' in Potatoes. Important varietal differences—dependence of the incidence of infection on the year's weather and on soil.]—*Mitt. für die Landw.* (formerly *Mitt. Deutsch. Landw.-Gesellsch.*), xlix, 18, pp. 378–380, 1934.

In connexion with recent attempts in Germany to substitute the wart [*Synchytrium endobioticum*]-resistant Erdgold potato for the susceptible Industrie, attention has been drawn to the liability of

the former to 'Eisenfleckigkeit' [*R.A.M.*, xiii, p. 467]. On an experimental farm under the writer's supervision near Breslau, it was recently necessary to sell for fodder a 5-hect. crop of Erdgold on account of the high proportion (10 per cent.) of diseased tubers, at a loss of M. 320 per hect.

In 1930 extensive trials were initiated on the reaction of over 200 potato varieties to 'Eisenfleckigkeit', the results of which (extending for the most part over a four-year period) indicated a high degree of resistance in 18 of the 85 wart-resistants tested, including Magdeburger Blaue, Maibutter, Goldappel, Juli, Cellini, Goldfink, Preussen, and Seydlitz, while six remained free from the trouble for the duration of the tests, namely, Frühe Hörnchen, Ambrosia, Kaiserkrone, Rotweissragis, Blaue Gelbfleischige, and Schlesien [Silesia]. The tendency towards 'Eisenfleckigkeit' is hereditary within a given variety, late sorts being predominantly affected; the disturbance is also more prevalent in large than in smaller tubers, so that the use of the former in varietal tests is important. One of the decisive environmental factors in connexion with the development of 'Eisenfleckigkeit' is the water balance, a disturbance of which in dry seasons and soils is accompanied by an access of injury. On 'acid' soils and with a 'physiologically acid' manuring schedule heavy applications of lime (20 doppelzentner per hect.) tend to reduce the amount of 'Eisenfleckigkeit'.

Stevenson (F. J.) & Clark (C. F.). **New Potato varieties.**—*Amer. Potato Journ.*, xi, 4, pp. 85–92, 1934.

Details are given of some promising new potato varieties recently developed through the co-operative researches of the United States Department of Agriculture and a number of State Experiment Stations. Two of the large number of varieties resistant to mild mosaic [*R.A.M.*, xiii, p. 465] have been named (Katahdin and Chippewa) and are being distributed. A high degree of resistance to the epidemic of late blight [*Phytophthora infestans*] in 1932 was shown at Presque Isle, Maine, by six selections of a progeny of Katahdin naturally fertilized. One heavily russeted seedling, 44537, proved more resistant to common scab [*Actinomyces scabies*] than any other varieties tested to date, not only in Maine but on heavily infested peat soil in Iowa. This potato, however, is such a low yielder compared with Irish Cobbler that it can only be recommended on soils where scab is a limiting factor.

Small (T.). **Report of the Mycologist.**—*Rapports aux États de Jersey pour l'année 1933*, pp. 30–48, 1934.

During 1933 the advantages of spraying potato crops against blight (*Phytophthora infestans*) were again demonstrated at several centres in Jersey [*R.A.M.*, xii, p. 549]. As in the previous year, apparently sound tubers from diseased plants developed the disease on keeping, except where the haulms had been killed before digging.

When freshly dug, healthy potatoes were inoculated with a spore suspension of *P. infestans*, packed in barrels in some of which holes were bored to secure ventilation, and sent to Weymouth and back, the percentage of diseased tubers in the holed barrels was,

respectively, 14, 9, 12, and 10 per cent., as against 34 and 19 per cent. for the unventilated barrels; on a journey to Holyhead and back ventilation was, however, much less effective.

In boxes of apparently sound tubers taken from diseased, unsprayed crops but dipped in formalin the average loss per box was 5 tubers, as compared with 13 for similar, undipped potatoes, the corresponding figures in another test being 2 and 14. Potatoes from unsprayed crops not dipped gave a loss of 26 tubers per box, as against 2 for undipped tubers from sprayed healthy plants, while in a further experiment the losses per box for dipped and undipped tubers from an unsprayed, diseased crop, and undipped tubers from a sprayed, healthy crop were, respectively, 10, 17, and 1.

Experimental evidence was obtained that the spores of *P. infestans* may remain alive in the soil for at least a week; this period should, therefore, be allowed to elapse between cutting the haulms and digging the tubers. The fungus may also overwinter on the plants; in February, 1932, and January, 1933, it was present on volunteer potatoes outdoors.

Notes are also given on some tomato diseases.

Husz (B.). **Ueber die Zugehörigkeit von Phellomyces sclerotiophorus Frank und dessen Unterscheidung von Spondylocladium atrovirens Harz.** [On the identity of *Phellomyces sclerotiophorus* Frank and its differentiation from *Spondylocladium atrovirens* Harz.]—*Zeitschr. für Pflanzenkrankh. u. Pflanzenschutz*, xliv, 4, pp. 186–191, 3 figs., 1934.

A preliminary note is given on the writer's investigations in Hungary on silver scurf of potatoes, commonly attributed to *Spondylocladium atrovirens* [*R.A.M.*, xi, p. 670] with which *Phellomyces sclerotiophorus* has been regarded as synonymous. However, on the basis of a microscopical examination of the diseased tubers, it is concluded that *Colletotrichum atramentarium* [ibid., xiii, p. 467] is responsible for most of the damage and that *P. sclerotiophorus* is identical with this organism. Only *S. atrovirens* (which frequently occurs on the same tubers) is capable of producing the typical silvery lesions which have given the disease its name, but the spots caused by *C. atramentarium* are often whitish and thus liable to confusion with the foregoing. The conidia of *C. atramentarium* both on plum decoction agar and diseased potato stems measured (7 to) 12 to 23·5 by 3 to 5 μ, the pluriseptate setae being up to 200 μ in length and 4 to 5 μ thick at the base [cf. ibid., v, p. 447]. The 4- to 7-cellular conidia of *S. atrovirens* were found to measure 23 to 46 by 6·5 to 8·5 μ. *C. atramentarium* develops much more rapidly than *S. atrovirens* in culture and it also differs from the latter in its capacity for growth on acid media.

Chu (H. T.). **Observations on the physiological characters of Phoma glumarum, the causal fungus of grain-blight of Rice plant.**—*1932 Year Book Bureau of Entom.*, Hangchow, China, pp. 192-198, 2 figs., 1933. [Chinese, with English abstract. Received 1934.]

Grain blight of rice (*Phoma glumarum*) [*R.A.M.*, xii, p. 395] is

stated to be very prevalent in the Chekiang district of China, causing losses of 25·33 per cent. in 1932. The physiological aspects of the disease are here discussed with a view to possible control.

MURRAY (R. K. S.). **Diseases of Rubber in Ceylon, 1933.**—*First Quart. Circ. for 1934, Rubber Res. Scheme (Ceylon)*, xi, 1, pp. 17–19, 1934.

In 1933, *Fomes lignosus* continued to be the chief source of loss on *Hevea* rubber plantations situated in wet parts of Ceylon [*R.A.M.*, xii, p. 591], where attacks by *Ustulina zonata* were also important. The diseases caused by *Phytophthora palmivora* [ibid., xii, p. 77] were not unduly severe; adequate control measures against the bark rot caused by this fungus have been taken on most well-managed estates and the position as regards the canker and secondary leaf fall due to it causes no apprehension. A considerable and disquieting extension of the areas at mid-country elevation severely affected with *Oidium* leaf disease [*O. heveae*: ibid., xii, pp. 323, 655] took place, apparently as a result of the acclimatization of the fungus.

O'BRIEN (T. E. H.). **Paranitrophenol in crêpe manufacture.**—*First Quart. Circ. for 1934, Rubber Res. Scheme (Ceylon)*, xi, 1, pp. 1–2, 1934.

The Rubber Research Scheme (Ceylon) is unable to recommend the continued use of paranitrophenol (P.N.P.) in the preparation of crêpe rubber, manufacturers having recently objected to it on the ground that it causes staining of certain coloured goods and wrapping paper. In tests of a commercial sample of crêpe staining of wrapping papers did in fact occur, and though there was no staining of rubber articles a coloured extract could always be obtained from them by soaking them in water. No objection has been raised to the use of P.N.P. as a mould preventive in smoked sheet [*R.A.M.*, xi, p. 802].

REINKING (O. A.) & MANNS (M. M.). **Parasitic and other Fusaria counted in Colombia soils.**—*Zentralbl. für Bakt.*, Ab. 2, lxxxix, 25–26, pp. 502–509, 1934.

The following species of *Fusarium* were isolated from Colombian soils in 1930–2 by methods which have already been described [*R.A.M.*, xiii, p. 128]: *F. dimerum*, *F. chlamydosporum*, *F. semitectum*, *F. equiseti* var. *bullatum*, *F. scirpi* and its var. *caudatum*, *F. moniliforme* [*Gibberella moniliformis*], *F. orthoceras* and its var. *triseptatum*, *F. bulbigenum*, *F. oxysporum* and its form 5, *F. solani* vars. *minus* and *martii* f. 1, and *F. javanicum* var. *theobromae*.

Practically all the soil samples examined came from the top six inches of the soil of areas planted with bananas. The most prevalent of the above-mentioned organisms was *F. solani* var. *martii* f. 1 (49·7 per cent. of the total number of isolations), followed by *F. equiseti* var. *bullatum* (14·7), *F. scirpi* (12·4), *F. chlamydosporum* (8·9), *F. bulbigenum* (5·2), and *F. oxysporum* f. 5 (3·5), the remainder probably being for the most part mere soil invaders.

Reinking (O. A.). **Interesting new Fusaria.**—*Zentralbl. für Bakt.*, Ab. 2, lxxxix, 25–26, pp. 509–514, 4 figs., 1934. [German summary.]

Latin diagnoses are given of four new representatives of the form genus *Fusarium*, viz., *F. tumidum* Sherb. var. *humi*, *F. sublimatum*, *F. elongatum*, and *F. concolor*, of which the three first-named were isolated from the upper soil layers of banana and cacao plantations in Central America, while the fourth was collected on foot-rotted barley in Uruguay.

Reinking (O. A.). **Parasitic and other Fusaria counted in Costa Rica and Panama soils.**—*Zentralbl. für Bakt.*, Ab. 2, xc, 1–4, pp. 4–17, 1934.

Further investigations were conducted on the lines of those already described for Honduras, Guatemala, and Colombia [*R.A.M.*, xiii, p. 128 and preceding abstracts] to determine the relative prevalence and distribution of *Fusarium* spp. in the various soil types comprising the lowland banana regions of Costa Rica and Panama. The following were the most widespread organisms: *F. dimerum*, *F. sublunatum*, *F. decemcellulare* [*Calonectria rigidiuscula*], *F. equiseti* var. *bullatum*, *F. bulbigenum*, *F. oxysporum* forms 3 [formerly *F. cubense*] and 5, *F. solani* var. *martii* f. 1 (predominating in every soil type examined regardless of flora), *F. solani* var. *eumartii*, and *F. javanicum* var. *theobromae*.

It is of interest to note that in this survey, unlike those earlier reported, some of the soils from which samples were taken had not been under bananas for ten years, and further that *C. rigidiuscula*, originally recorded on cacao, was common in the vicinity of this crop. *Gibberella saubinetii* (*F. graminearum*) was isolated from the soil round badly diseased bananas for the first time in Panama. Adjacent to the bananas was a maize plot from which the fungus may have spread. Under tropical conditions it undoubtedly behaves as a definite soil invader.

Rao (Y. V. S.). **Contributions to the physiology of Sandal (Santalum album, Linn.). Part II. Influence of host on the nitrogen metabolism of Sandal.**—*Journ. Indian Inst. Sci.*, xvi A, 15, pp. 178–184, 1934.

Sandal (*Santalum album*) without a host was found, in the author's studies near Bangalore, South India, to resemble the spiked plant in its low protein and high water-soluble nitrogen content [*R.A.M.*, xiii, p. 198]. On the other hand, the ammonia content of hostless sandal is higher and the amide nitrogen lower than that of the host-fed plant. In this respect the hostless sandal differs from the spiked, the ammonia and amide contents of which are not significantly modified as compared with healthy individuals.

Dodds (H. H.) & Fowlie (P.). **The effect of streak disease on the yield of Uba Cane. Part II.**—*South African Sugar Journ.*, xviii, 4, pp. 241, 243, 1934.

In 1932 the writers described the effect of streak disease [*R.A.M.*,

xiii, pp. 397, 472] on the plant cane and first ratoon crops of a field of Uba planted with alternate plots of streaked and healthy setts [ibid., xi, p. 603]. The second ratoon crop was harvested on 24th May, 1933, when a yield of 30·81 tons per acre was obtained from the originally streaked cane as compared with 33·47 from the originally healthy, representing a reduction from the disease of 7·95 per cent., the corresponding losses for 1931 (first ratoon) and 1929 (plant cane) being 10·33 and 11·24 per cent., respectively. The spread of streak from the diseased into the originally healthy plots has reduced the difference between the two series. Owing to the omission of roguing and of the selection of healthy setts, districts relatively free from streak ten years ago, such as parts of the Eshowe and Chaka's Kraal areas, are now widely infected. In the Inanda division, on the other hand, where systematic efforts have been made to combat streak, the fields have remained relatively free from the disease. In severely infested areas the sole practicable measure consists in the replacement of Uba by one of the newly released commercial resistant varieties, e.g., Co. 281, P.O.J. 2878, 2714, and 2727. Co. 290 and P.O.J. 2725 appear to be slightly less resistant than the foregoing, but sufficiently so to be useful substitutes for Uba under favourable conditions for their cultivation. CH 64/21 seems to be even more susceptible than Uba to streak in certain districts, and appreciably less tolerant, the loss in weight of a plant cane crop of the former variety in a recent experiment amounting to 29 per cent. compared with 10 to 12 per cent. in the latter.

Abbott (E. V.). **Seed rots of Cane in Louisiana.**—*Sugar Bull.*, xii, 4, pp. 6–7, 1933. [Abs. in *Internat. Sugar Journ.*, xxxvi, 424, p. 163, 1934.]

Red rot of sugar-cane cuttings used for seed, caused chiefly by *Colletotrichum falcatum* [*R.A.M.*, xii, pp. 679, 724] and to a less extent by *Melanconium sacchari* [*Pleocyta sacchari*: ibid., xii, pp. 246, 552], has become a serious problem in Louisiana as a result of the extensive failures due to it of P.O.J. 213, locally the leading commercial variety.

Ramsbottom (J.). **Notes on mycological nomenclature.**—*Trans. Brit. Mycol. Soc.*, xviii, 4, pp. 314–319, 1934.

The author first deals with the dates from which nomenclature in the fungi starts; and also decides that Fries's *Elenchus* should be considered an integral part of his *Systema Mycologicum*. He then discusses at length Wiltshire's recent citation of '*Alternaria cheiranthi* (Fr.) Bolle excluding specimen'. Assuming that Wiltshire [*R.A.M.*, xiii, p. 326] is correct in his assertion that *Macrosporium cheiranthi* Fr. is an *Alternaria*, but not the same species that Bolle described and figured under the name of *A. cheiranthi* (Fr.) Bolle, he thinks that the latter citation will be permanently misleading for *M. cheiranthi* Fr.; and accordingly considers that the rules should be modified so as to allow of the citation *A. cheiranthi* (Fr.) Wiltshire.

Unamuno (L. M.). **Notas micológicas. VII. Algunos datos interesantes para la flora micológica española.** [Mycological notes. VII. Some interesting records for the Spanish mycological flora.]—*Bol. Soc. Española Hist. Nat.*, xxxiv, 2–3, pp. 133–146, 9 figs., 1934.

Continuing his series of taxonomic observations on fungi collected in different parts of Spain [*R.A.M.*, xiii, p. 183], the writer enumerates 41 species, four of which are described as new. The leaves of *Colchicum autumnale* were found to be attacked by *Tuburcinia colchici* (Schlecht.) Liro (*Urocystis colchici* Fcl) [ibid., ii, p. 54; iv, p. 210], producing longitudinal, black stripes. The spores are arranged in globose or oblong glomerules, 20 to 30 by 16 to 20 μ, the smooth, pale chestnut, central, fertile spores, 1 to 5, generally 2 to 4 in number, measuring 10 to 15 μ in diameter, while the peripheral, sterile ones, which are pale yellow with a slightly darker membrane, are of variable dimensions, usually 5 by 4 to 8 μ. This is a new record for Spain.

Unamuno (L. M.). **Contribución al estudio de los hongos microscópicos de Galicia.** [A contribution to the study of the microscopic fungi of Galicia.]—*Rev. Acad. Cien. Madrid*, xxx, 3, pp. 460–518, 9 figs., 1933.

An annotated list is given of 198 microscopic fungi collected by the writer in Galicia, Spain, in 1931, of which 6 are new to science and 40 to the Spanish flora. Among the former may be mentioned *Septoria digitalicola* n. sp. and *Colletotrichum digitalis* n. sp., both on *Digitalis purpurea*; Latin diagnoses are given. *S. digitalicola* forms circular, brown spots with reddish-purple margins, 6 to 8 mm. in diameter, on both leaf surfaces. The fungus is characterized by sparse globose to ellipsoid, brown to fuliginous pycnidia, 25 to 86 by 20 to 65 μ, and continuous, hyaline, straight or curved conidia, rounded at both ends or somewhat tapering at one extremity, 12 to 20 by 3·5 μ. The round, diffuse, ochraceous-brown lesions produced on the leaves by *C. digitalis* frequently cover the entire surface. The fungus forms numerous black, gregarious acervuli, 88 to 100 by 28 μ, brown, septate, straight, curved, or flexuous, often nodular setae, 63 by 3·5 to 4 μ, and hyaline, cylindrical, usually straight, sometimes slightly curved conidia, rounded at both ends, and measuring 16 to 22 by 3 to 3·5 μ.

The numerous other interesting records include *Phyllosticta* (*Ascochyta*) *aceris*, which was found in association with *Phleospora aceris* forming numerous large, circular, pale ochraceous, reddish-bordered spots on the leaves of *Acer pseudo-platanus*, a new host for Spain; *Phyllosticta perniciosa*, a new record for Spain, sometimes occurred on the same leaves and caused considerable damage. *P.* (*Phoma*) *iridum* produced longitudinal, dark-edged lesions on the foliage of *Iris pseudacorus*, being new to the Spanish flora. *Coniothyrium fuckelii* [*Leptosphaeria coniothyrium*: *R.A.M.*, xiii, p. 174] occurred on dry shoots of *Poterium magnolii* [*P. sanguisorba* or *Sanguisorba minor*], a new host for this fungus. *Fusicladium saliciperdum*, the conidial stage of *Venturia chlorospora* [ibid., xii, p. 355], was observed for the first time in Spain causing severe damage to willows (*Salix triandra*). *Macrosporium cookei*

(*M. solani* Cooke nec. Ell.) [*Alternaria crassa*], a new species for Spain, was found on *Datura stramonium* leaves [ibid., vii, p. 764].

Bisby (G. R.), Buller (A. H. R.), & Dearness (J.). **Additions to the fungous flora of Manitoba II.**—*ex Thirteenth Ann. Rept. Canadian Plant Disease Survey 1933*, pp. 93–102, 1934. [Mimeographed.]

The 289 additions comprised in this second supplement to 'The Fungi of Manitoba' [*R.A.M.*, xi, p. 546] bring the total of known species in the province (1st November, 1933) to 2,400, exclusive of human and animal pathogens.

Jørstad (I.). **A study on Kamtchatka Uredinales.**—*Skr. Norske Vidensk.-Akad. Oslo I. Matem.-Naturvid. Kl., 1933*, 9, 183 pp., 22 figs., 1934.

A fully annotated list is given of 90 rusts collected in the Kamtchatka Peninsula, 81 of which were determined by the writer. Most of the Uredinales included are of very wide distribution, only 14 being confined to Asia, of which four are indigenous to Kamchatka [cf. *R.A.M.*, xiii, p. 398]. A seven-page bibliography and host and fungus indices are appended.

Wilkins (W. H.). **Studies in the genus Ustulina—with special reference to parasitism. I. Introduction, survey of previous literature, and host index.**—*Trans. Brit. Mycol. Soc.*, xviii, 4, pp. 320–346, 1934.

In this first instalment of his studies in the genus *Ustulina* the author gives a brief survey of the previous literature relating to the more widely known and presumably more economically important species of this genus, starting from the first recognizable mention of it by Michelli in 1729 down to 1932. A full, chronological and annotated list of the publications consulted is appended, as well as a host index, and an alphabetical index of the authors mentioned.

Castellani (E.). **Recherches préliminaires sur la biologie de quelques Rhizoctones.** [Preliminary investigations into the biology of some species of *Rhizoctonia*.]—*Boll. Sez. Ital. della Soc. Internaz. Microbiol.*, vi, 4, pp. 117–119, 1934.

After referring to earlier Italian work on endotrophic mycorrhiza [*R.A.M.*, iii, p. 539] and the relation between soil-inhabiting fungi and the higher plants [ibid., xi, p. 389; xii, p. 85] the author gives a brief account of his investigations on certain species of *Rhizoctonia* which, unlike those forming typical mycorrhiza on the Orchidaceae [ibid., xiii, p. 309], are weak parasites of the roots of various plants.

From eight species of phanerogams, mostly from Tuscany, the Apennines, and Emilia, eight strains of *Rhizoctonia* were isolated, each being considered by the author to represent a distinct species except one from *Cedrus* [*libani* var.] *deodara*, which was a variety of *R.* [*Corticium*] *solani* [see next abstract]. The strains fell into two groups; one grew copiously and developed a thick mycelium which rapidly turned brown and showed brown, occasionally very

large, sclerotia, while the other showed a transparent mycelium (which in a few instances finally became yellowish) with small, whitish sclerotia which much later became light brown. The first (and much more virulent) group included strains from potato (*R.* [*Corticium*] *solani*), *C. libani* var. *deodara* (*R. solani* var. *cedri*), lupin (*R. lupini*), and ash (*R. fraxini*); the second included those from *Viola palustris* (*R. alpina*), oak (*R. quercus*), and *Pinus insignis* (*R. pini insignis*). All the forms, except the last-named, grew well on ordinary media and all grew at a wide range of P_H values, though except for *R. lupini* and *R. pini insignis* the optima for which were, respectively, P_H 4·4 and 8·4, their optimum growth took place near neutrality. All tended to bring the liquid media to a constant, characteristic P_H value, and they all produced pectolytic enzymes: they liberated toxins which reduced the transpiration of wheat by causing necrosis of the roots and histological lesions in the tissues [ibid., x, p. 610].

Castellani (E.). **Recherches morphologiques et systématiques sur quelques Rhizoctones.** [Morphological and systematic researches on some species of *Rhizoctonia*.]—*Boll. Sez. Ital. della Soc. Internaz. Microbiol.*, vi, 4, pp. 119–121, 1934.

In this further note on the eight strains of *Rhizoctonia* isolated from the roots of various plants in Italy [see preceding abstract] the author states that he considers the genus to be very heterogenous, including as it does species forming part of the life-cycle of pycnidial fungi and others representing the vegetative stage of the Basidiomycetes. The former should be separated off and the genus divided into two further sub-genera (1) *Eurhizoctonia*, to include *R. crocorum* [*Helicobasidium purpureum*] and other similar species which, presumably, are part of the biological cycle of the lower Basidiomycetes with divided basidia, and (2) *Moniliopsis*, which includes *R.* [*Corticium*] *solani* and analogous species, all of which appear to have as their perfect form Basidiomycetes of the type of *Hypochnus* or *Corticium*.

The author's organisms are of the *Moniliopsis* type, of which he intends to give a new diagnosis. Six are new species. An analytical key is given to assist in their identification, based on their more stable morphological characters, but there is no full technical description.

Servazzi (O.). **Su alcune Pestalotia parassite facoltative di piante ornamentali.** [On some *Pestalozzia* facultative parasites of ornamental plants.]—*La Difesa delle Piante*, xi, 1, pp. 16–35, 4 figs., 1934.

Notes are given on the morphology, systematic position, and pathogenicity of a number of species of *Pestalozzia* isolated by the author from various ornamental plants in Piedmont during 1932–3, the records made including *P. vermiformis* on *Arbutus unedo*, *P. macrotricha* and *P. rhododendri* [*R.A.M.*, xi, p. 389; xii, p. 696] on species of *Rhododendron*, *P. funerea* [ibid., xii, p. 332] and *P. macrochaeta* on *Araucaria imbricata*, *P. michineri* on *A. brasiliana*, *P. conspicua* n. sp. on *Stanhopea tigrina*, *P. microspora* on *S. oculata*, and *P. clusiae* on *Cymbidium lowianum*.

From a study of the literature and his own observations the author concludes that *P. macrotricha* and *P. rhododendri* are weak parasites, *P. vermiformis* and *P. funerea* pure saprophytes, *P. macrochaeta* and *P. michineri* hemiparasites, and *P. conspicua*, *P. microspora*, and *P. clusiae* saprophytes or, at most, weak parasites.

A bibliography of 41 titles is appended.

Ledingham (G. A.). **Zoospore ciliation in the Plasmodiophorales.** —*Nature*, cxxxiii, 3362, p. 534, 1 fig., 1934.

The zoospores of *Plasmodiophora brassicae* and *Spongospora subterranea* are habitually described as uniciliate [*R.A.M.*, x, p. 3; cf. also xii, p. 468], but on staining by Cotner's method (*Bot. Gaz.*, lxxxix, p. 295, 1930) another cilium, shorter and less conspicuous than that apparent in the living zoospore, may be detected. Large numbers of such biciliate zoospores were obtained by germinating, in dilute inorganic nutrient solutions, resting spores that had previously been repeatedly wetted, frozen, and dried.

Meurs (A.). **Parasitic stemburn of Deli Tobacco.**—*Phytopath. Zeitschr.*, vii, 2, pp. 169–185, 19 figs., 1934.

During 1932–3 the writer carried out extensive cultural studies at the 'Willie Commelin Scholten' Phytopathological Laboratory, Baarn, Holland, on three of the four *Pythium* species causing stem burn of tobacco in Sumatra, namely, *P. aphanidermatum*, *P. myriotylum*, and *P. deliense* n. sp. [*R.A.M.*, vi, p. 445; xiii, p. 475].

The terminal, smooth, globose oogonia of *P. aphanidermatum* [ibid., xiii, p. 399] measure 16·7 to 28·7 μ, mostly 20 to 25·1 μ, average 22·9 μ; the generally intercalary, barrel- or dome-shaped, diclinous antheridia, which are usually single, rarely two to an oogonium, measure 8·7 to 16·3 μ, mostly 11·4 to 14·3 μ in diameter in the distal portion and 13·8 to 31 μ in length; and the smooth oospores range from 15·6 to 26·2 μ, mostly 18·7 to 22·5 μ, average 20·5 μ.

Drechsler's diagnosis of *P. myriotylum* [ibid., x, p. 211] is recapitulated. The sporangia frequently include a number of swollen lobulate or digitate elements, 10 to 175 by 7 to 17 μ, from which the evacuation tubes, 10 to 100 by 2 to 3·5 μ at the base, arise. The terminal or intercalary, subspherical oogonia measure 15 to 44 μ in diameter (average 26·5 μ), and are provided with 3 to 6 or up to 10 clavate, crook-necked or arched antheridia, 8 to 30 by 4 to 8 μ, mostly 8 to 16 by 4·5 to 7 μ, borne terminally or inclining laterally on branches more or less closely enveloping the oogonium, proceeding from one to three parent hyphae not demonstrably connected with the oogonial filament. The subspherical, hyaline or yellowish oospores measure 12 to 37 μ in diameter, 12 to 26 μ in abundant development, mostly 18 to 24 μ (average 20·8 μ). The oogonia in the writer's strains of *P. myriotylum* are slightly larger than those described above, ranging in diameter from 21·2 to 38·1 μ, mostly 26·1 to 32·1 μ (average 28·6 μ). This species was referred by Van Hall to *P. polyandrum* [ibid., iv, p. 595], the latter name, however, being considered a *nomen nudum* in the absence of a description.

The terminal, rarely intercalary sporangia of *P. deliense* measure up to 210 μ in length and are of variable diameter, though always larger than the parent hypha; digitate branching seldom occurs. The discharge tube is mostly terminal, of very variable length (21 to 303·7 μ); from 3 to 25 zoospores, 8 to 12 μ in diameter, are formed in a vesicle. The terminal, smooth, globose oogonia vary from 15·1 to 23·1 μ in diameter, mostly 16·2 to 20 μ (average 18·2 μ); the single intercalary or terminal antheridium (rarely two) ranges from 12·8 to 27 by 4·7 to 15·5 μ, mostly 14·1 to 20·3 by 8·1 to 11·4 μ, the antheridial branch usually being straight while the oogonial hypha arising from it is strongly bent towards the antheridium. The smooth oospores range in diameter from 12·5 to 17·5 μ, mostly 13·7 to 16·2 μ, average 14·8 μ. This species is closely related to *P.* (*Nematosporangium*) *indigoferae* Butler [ibid., xi, p. 129], the differences between them being briefly indicated. It also seems probable that Van Breda de Haan's *Phytophthora nicotianae* is based on a mixed culture as already suggested by Ashby [ibid., vii, p. 601], and that the oospore-forming component was identical with *Pythium deliense*.

The symptoms of parasitic stem burn are described, its history briefly reviewed, the distribution of the causal organisms in tobacco-growing districts tabulated, and the control measures devised by Jochems summarized [ibid., vi, p. 446].

Van Schreven (D. A.). **Uitwendige en inwendige symptomen van boriumgebrek bij Tabak.** [External and internal symptoms of boron deficiency in Tobacco.]—*Tijdschr. over Plantenziekten*, xl, 4, pp. 98–112; 5, pp. 113–128, 3 pl., 1934. [English summary.]

Rhenen tobacco plants grown in nutrient solutions without boron or in glass-sand washed for 24 hours with concentrated hydrochloric acid developed the typical symptoms of boron deficiency, including weakness and discoloration of the root system, death of the growing point and axillary buds, thickening, chlorosis, and wrinkling of the leaves, often with downward bending of the main and lateral veins, discoloration of the vascular tissue, and stunting. The transference of healthy mature plants to a medium deprived of boron may be followed either by the development of wrinkling in the upper foliage or merely by the shedding of the flowers and death of the axillary buds, with little or no stunting. In the sand cultures not washed with hydrochloric acid there was a marked bending over of the top of the stem but the top did not fall off as often occurs in the 'top disease' found in Deli, Sumatra [*R.A.M.*, xi, p. 480], possibly because the plants were not grown in the open. The general similarity of the two conditions, however, is considerable. Some traces of boron were evidently contained in the glass-sand prior to its treatment with hydrochloric acid, since plants grown in sand not washed with the acid developed comparatively well.

Starch translocation is impeded in plants suffering from boron deficiency, which further show a brown discoloration and disorganization of individual cells or cell groups in the apical and procambial regions. When the whole root system is involved the top of the

plant is already dead, but the axillary buds continue to develop until the boron supply is exhausted. The disturbance gradually extends to the base of the buds, the stem nodes, and the vascular tissue of the main leaf veins. The phloem is immensely enlarged by extensive radial division, the cells often being irregularly distorted or compressed and broken down. The xylem is usually poorly developed and contains disintegrated cells. The ground parenchyma, epi-, endo-, or exodermis, collenchyma, and pericycle cells may all be similarly affected by a brown discoloration followed by disintegration. An excess of calcium oxalate crystals is frequently found.

The unilateral growth and bending of the stems is readily explicable by a local disorganization of the stelar structure, which prevents the normal elongation of the cells of one side. Similarly, the curvature of the leaf veins is due to the contraction of the phloem on the under side, a phenomenon characteristic also of tobacco curl and crinkle [ibid., xii, p. 474]. The thickening of the leaf blade arises from the enlargement of the individual cells, the chloroplasts in which are smaller than those of healthy tissue and supply correspondingly less chlorophyll—hence the chlorotic areas of the leaf. Diseased plants are richer in starch and sugars than healthy ones, presumably owing to the obstruction of transport through the disorganized phloem. The nucleus may be enlarged in the diseased mesophyll cells.

Secondary factors involved in the root, stem, and leaf deterioration associated with boron deficiency include the poisoning of the plants by the immobilization of sugars and proteins combined with impaired absorption and distribution of the elements requisite for normal growth.

GRANT (T. J.). **The host range and behavior of the ordinary Tobacco-mosaic virus.**—*Phytopath.*, xxiv, 4, pp. 331–336, 3 figs., 1934.

In a series of inoculation experiments with ordinary tobacco mosaic at Wisconsin University on 121 non-Solanaceous species of plants representing 40 families and 104 genera, 29 species were found to be susceptible, including buckwheat, garden and sugar beets, spinach, New Zealand spinach (*Tetragonia expansa*), mustard (*Brassica alba*), turnip, beans (*Phaseolus vulgaris*), carrot, foxglove (*Digitalis purpurea*), phlox, *Antirrhinum majus*. *Zinnia elegans*, and a number of other ornamentals, of which *Phacelia whitlavia* showed systemic symptoms of a type very similar to those exhibited by tobacco, spinach being similarly affected. In other hosts the symptom expression was local or erratic. The properties of the virus, as measured by thermal death point, tolerance to dilution, and ageing *in vitro*, were not appreciably influenced by the host in which it developed. In tobacco mosaic-infected spinach the concentration of the virus was apparently very low, but sap from healthy spinach and from certain other plants proved detrimental to the highly concentrated virus from tobacco. Low infection percentages from certain susceptible species are not necessarily, therefore, a result of low concentrations of the virus in such hosts. Cytological examination revealed the presence of cell inclusions,

consisting of 'X-bodies' and striate material [*R.A.M.*, xi, p. 796] in *P. whitlavia*, *Delphinium consolida*, *Linaria cymbalaria*, foxglove, spinach, and *Scrophularia marylandica*.

Wolf (F. A.), Dixon (L. F.), McLean (Ruth), & Darkis (F. R.). **Downy mildew of Tobacco.**—*Phytopath.*, xxiv, 4, pp. 337–363, 3 graphs, 2 maps, 1934.

A comprehensive account is given of the writers' studies in the United States on downy mildew (blue mould) of tobacco, which is attributed on the basis of morphological and taxonomic observations to *Peronospora nicotianae* Speg. [*R.A.M.*, xiii, p. 132].

The elliptical to oval, violet sporangia of the fungus, 15 to 28 by 12 to 18 μ, are borne on dendritic, four to eight times dichotomously branching sporangiophores, 400 to 750 μ in height, 10 to 12 μ at the base, terminating in curved, acute apices. Sporangial production begins with dawn and the organs are mature by sunrise. To the spherical oogonia, 60 to 85 μ in diameter, are applied bluntly clavate antheridia. The oospores are reddish-brown, 45 to 75 μ in diameter, with the wall thickened into low, blunt elevations and ridges and with a hyaline outer sheath, which collapses; they could not be induced to germinate. According to Angell and Hill (*Commonwealth Council Sci. & Indus. Res. Bull.* 65, 1932), the oospores (rarely found in Australia) measure 28 to 50 μ in diameter, while the dimensions recorded by Spegazzini are 50 to 80 μ. These workers, like the present writers, found that *Hyoscyamus niger* is immune from the pathogen causing downy mildew of tobacco, to which the name *H. hyoscyami*, therefore, appears inapplicable. On the other hand, the downy mildew organism is capable of parasitizing numerous species of *Nicotiana*, a fact that points to its identity with *P. nicotianae*. A further alternative is the possible occurrence of two species of *Peronospora* on tobacco, of which the downy mildew pathogen is so far undescribed. For the present, however, it seems advisable to use the name *P. nicotianae* for the latter.

Seedlings of all agricultural varieties of flue-cured tobacco seem to be equally susceptible to downy mildew, which has also been detected on tomato, pepper (*Capsicum annuum*), and eggplant in proximity to tobacco [*R.A.M.*, xiii, p. 191]. Penetration is accomplished by the entrance of the infection hyhae through the leaf stomata, the mycelium passing between the cells, the walls of which are penetrated by digitate haustoria. Within the dead tissues oospores are formed and mature four to seven days after the death of the cells in the infected tissues. The production of toxic water-soluble substances which spread throughout the plant is believed to be partially responsible for the high percentage of mortality (50 to 90 per cent. in 1932 and 1933) among transplanted seedlings.

The sporangia of *P. nicotianae* have been trapped at distances up to several miles from diseased seed-beds, indicating that they are air-borne. At Oxford, North Carolina, they were found a week before the outbreak of downy mildew in the tobacco beds. The sporangia, which may be entrapped by the glandular hairs on tobacco, are dependent for germination on the presence of abundant moisture. At 45° to 60° F. germination is accomplished in two

hours, at 70° in five hours, at 79° it does not take place, while at 82° the sporangia are killed in 42 hours and at 84° in 1 hour. Exposure for about an hour to direct sunlight is lethal in general; the sporangia are relatively short-lived except at low temperatures. A decisive influence on the course of downy mildew is exercised by meteorological conditions, the disease being arrested by clear days with temperatures of 84° upwards and promoted by rainy weather with overcast skies and temperatures between 50° and 60°.

The primary centres of infection by downy mildew in the early spring are seed-beds situated on or near the sites occupied by old beds, and the choice of fresh positions for new plantings is therefore one of the most important control measures [cf. ibid., xiii, p. 401]. Other sanitary practices calculated to reduce infection are indicated, including the application of nitrate of soda to the seedlings in the incipient stages of an attack in order to stimulate recovery.

Volgunov (G. P.). **The development of micro-organisms on fermenting Tobacco.**— *State Inst. Tobacco Invest. U.S.S.R.*, 87, pp. 52–72, 1933. [Abs. in *Chem. Abstracts*, xxviii, 12, p. 3760, 1934.]

The influence of the composition of the medium, reaction, and oxygen tension on the development of fungi and other micro-organisms in the tobacco-fermenting process is discussed. Small quantities of formalin were found to stimulate fungal activity, which was totally inhibited, on the other hand, by a 75 per cent. carbon-dioxide content in the air chamber and partially suppressed by one of 50 per cent.

McCallum (A. W.). **Check list of diseases of forest and shade trees.**—ex *Thirteenth Ann. Rept. Canadian Plant Disease Survey 1933*, pp. 76–92, 1934. [Mimeographed.]

A list (which is to be periodically revised) is given of the principal fungous diseases of trees in Canada, together with a number not yet definitely known but considered likely to occur in the country.

Allain (A.). **La formation des œufs du Phytophthora cambivora en culture pure.** [The formation of oogonia by *Phytophthora cambivora* in pure culture.]—*Comptes rendus Soc. de Biol.*, cxv, 13, pp. 1521–1523, 3 figs., 1934.

Oogonia were produced in abundance by the agent of ink disease of chestnuts (*Phytophthora cambivora*) [*R.A.M.*, xiii, p. 336] at room temperature on Petri's synthetic medium [ibid., v, p. 681; vii, p. 366] with agar at various concentrations as well as on distilled water and agar (P_H 4·8 to 6·5). The minimum period required for oospore formation under these conditions was seven days. The cultures were obtained exclusively from mycelium grown on carrot agar for four to five days only before transference to the synthetic medium.

Horton (G. S.) & Hendee (Clare). **A study of rot in Aspen in the Chippewa National Forest.**—*Journ. of Forestry*, xxxii, 4, pp. 493–494, 1934.

Two important rots of felled aspen (*Populus tremuloides*) were

found in a survey of one $\frac{1}{4}$-acre and four $\frac{1}{8}$-acre plots in the Chippewa National Forest, Lake States, due to *Fomes igniarius* (with which the present study is mainly concerned) [*R.A.M.*, ix, p. 749; xiii, p. 338] and *F. applanatus* [*Ganoderma applanatum*].

Three stages of the white wood rot caused by *F. igniarius* were recognized, in the first of which the centre heartwood is only discoloured by streaky, black lines radiating out from the centre of the log. The second phase is marked by an extension of the lines and incipient breakdown of the wood at the centre. In the third and final stage the affected portion is completely collapsed, necessitating the full amount of deduction for defect in scaling for the entire area involved. The small, round, brownish fruiting bodies of the fungus usually begin to appear during the second phase of the rot, but only in the closing stage do they show 'annual rings'. From an examination of 108 cut trees it was ascertained that when only one small fruit body is present, the average extension of decay above it is 2 ft. and below 2·5, the corresponding figures for a large fructification being 2·8 and 5 ft., respectively. Where there are more than one small fruit body, the rot will extend roughly 3 ft. above and below them, the corresponding distances for several large fructifications being 5 and 5·5 ft., respectively.

The white butt rot caused by *G. applanatum* seldom extends up into the bole for more than 2 ft.

KOMAROV (F.). **Chemical composition of wood damaged by wood-destructive rots.**—*Bumazhn. Prom.* [*Paper Industry*], xiii, 2, pp. 49–60, 1934. [Abs. in *Chem. Abstracts*, xxviii, 11, p. 3553, 1934.]

An experimental study of the chemical properties of sound and rotted wood in relation to pulping and hydrolysis was carried out [in Russia] with 16 samples of living pine, spruce, aspen, and birch and some structural timber. The extractable matter was determined with hot water, ether, and 1 per cent. sodium hydroxide at 18° [C.], and the lignin, pentosan, cellulose, and ash contents of the extracted samples estimated. Hydrolysis was determined with 0·5 and 72 per cent. sulphuric acid and water absorption with sawdusts.

In all the samples, except one of aspen, the hygroscopicity of the sawdusts of rotted woods was 1 to 1·5 per cent. below the normal. Living wood in the second and third stages of white rot [*R.A.M.*, xii, p. 740] due to *Trametes pini* [ibid., xiii, p. 135] and *T. abietis* [ibid., vii, p. 813] show little change in the relative contents of cellulose and pentosans as compared with sound material, and can be utilized for pulping and hydrolysis. Pine attacked by the white rot *Polyporus destructor* [ibid., viii, p. 79] contains a higher percentage of cellulose than a normal tree (68 as against 52) and less lignin. The destructive brown rots of pine and spruce due to *Merulius lacrymans* and *Fomes pinicola* [ibid., xii, p. 261] cause a sharp decrease in the cellulose and pentosan content and an increase of lignin. Birch damaged by white rot is highly complex in chemical composition and unsuited for practical uses; cellulose in this tree is decomposed both by *F. igniarius* [see preceding abstract] and *P. betulinus* [ibid., xi, p. 552]. The yields of

reducing sugars obtained by hydrolysis were found to be equal in sound and rotting wood, or even above the average in pine attacked by *P. destructor*.

BRAMBLE (W. C.). **Occurrence of the Strumella disease in the mid-west.**—*Journ. of Forestry*, xxxii, 5, p. 614, 1934.

Attention is drawn to the occurrence of large cankers and fruiting bodies of *Strumella corynoidea* [*R.A.M.*, xiii, p. 406] on red oak (*Quercus borealis maxima*) trunks in Rice County, Minnesota, a record lending additional support to the view that the disease is either native to North America or has been present in the country for a lengthy period.

SERVAZZI (O.). **Note riassuntive sui parassiti e la patologia di Pioppi.** [Summarized notes on the parasites and pathology of Poplars.]—*La Difesa delle Piante*, xi, 2, pp. 41–62, 1934.

A list is given of the species of fungi hitherto recorded in Europe, together with some from America, on Canadian poplar [*Populus canadensis*: *R.A.M.*, x, p. 417] and its closely related species, and notes are added on various diseases observed in Europe including those caused by *Rosellinia amphisphaerioides*, *Dothichiza populea* [ibid., xii, p. 127 ; xiii, p. 480], *Venturia tremulae* Aderh., *Phoma canadensis*, *Pholiota destruens*, and *Hypholoma fasciculare*; the paper concludes with a short account of bacterial canker [ibid., xiii, p. 408].

JØRGENSEN (C. A.). **Bøgens kimbladskimmel og dens Bekaempelse.** [The cotyledonary leaf fungus of the Beech and its control.]—*Dansk Skovforen. Tidsskr.*, *1934*, 4, pp. 123–127, 1934.

A popular note is given on the cotyledonary leaf fungus of beech seedlings (*Phytophthora fagi*) [*R.A.M.*, ii, p. 435 ; x, p. 755], which causes losses of up to 90 per cent. of the stand in Danish forest nurseries, and on its control by spraying twice with 2 per cent. Bordeaux or Burgundy mixture or dusting four times with Bordeaux dust.

LACHMUND (H. G.). **Growth and injurious effects of Cronartium ribicola cankers on Pinus monticola.**—*Journ. Agric. Res.*, xlviii, 6, pp. 475–503, 6 graphs, 1934.

This is a detailed account of the author's study during ten consecutive years of the seasonal growth of the cankers caused by blister rust (*Cronartium ribicola*) on the native western white pine (*Pinus monticola*) [*R.A.M.*, xiii, p. 339] in six different areas in south-western British Columbia, representing a variety of climatic conditions typical for the native range of the host. The results [shown in the form of tables and graphs] indicated that the size of the infected woody organ (twig, branch, or trunk) and the local ecological conditions were the main factors in determining the rate at which the cankers developed, while the vigour of the infected stem was of relatively slight importance, and that on the average

about 85 per cent. of the year's growth of the canker occurred during the active vegetative season of the host from spring to autumn. There was evidence that the longitudinal extension of the canker is directly related to the diameter of the infected stem. On the trunks which taper slowly, the downward spread of the cankers averaged nearly the same as the upward growth, while on the smaller, slower growing twigs which taper rapidly, the downward growth was over 30 per cent. greater than the upward. As a general rule, the curves for longitudinal growth rate over size of part infected were parabolic in form, rising steeply between stem diameters of 1 to 2 in., and tending to become almost horizontal at diameters over 5 in. Under optimum local conditions, the average annual downward growth of the cankers ranged from about 2 in. on the smallest twigs to about 5 in. on stems over 6 in. in diameter. Lateral or girdling growth was measured only on the larger stems, and was found to range from about 2·5 or 3 in. in areas of slower growth to about 3·5 in. in the optimum areas. On the smallest stems, girdling occurred within a few months during the growing season, and on the larger stems the average number of years required for girdling was about the same as the number of inches of stem diameter.

Death of a girdled stem down to the lower margin of the canker usually occurs in from one to four years following girdling, and if the canker is situated low enough on the stem or if the latter is in a weakened condition, the entire branch or trunk may die in that time; otherwise, the canker continues its downward spread with further die-back of the stem following irregularly behind it or even overtaking it, in which case the canker dies out before it can reach the main trunk. Such dying-out of the cankers is most frequent on the larger trees where the branches are longer, and the lower and inner portions of the crowns are under suppression. It was also found that most of the serious injury and killing of the trees results from girdling well down on the trunk by cankers which have spread down from the limbs.

The paper also contains a description of a method for the calculation of the time element and the determination of the manner of killing or injury by the cankers under determinable environmental conditions, illustrated by a few hypothetical cases.

ROHDE (T.). **'Zur Biologie der Douglasienschütte.'** ['On the biology of the leaf fall of Douglas Fir.']—*Zeitschr. für Forst u. Jagdwesen*, lxvi, 3, pp. 151–156, 1934.

The writer discusses Liese's hypothesis concerning the resistance to leaf fall (*Rhabdocline pseudotsugae*) of the so-called 'coastal' [green] forms of Douglas fir [*Pseudotsuga taxifolia*: *R.A.M.*, xii, p. 255; xiii, p. 482], and rejects the view that the absence of infection in stands of this type is a necessary concomitant of the late habit of growth. According to Liese, the main period of infection by the ascospores in north Germany is from 10th to 20th May, so that delayed needle formation automatically restricts the time of exposure to the attacks of the fungus. The writer, however, has obtained fresh ascospores more than a month later and

concludes that lateness of development alone is not a primary factor in producing immunity from leaf fall.

ROHDE (T.). **Kann man Rhabdocline pseudotsugae durch Aushieb vertilgen ?** [Can *Rhabdocline pseudotsugae* be eliminated by felling ?]—*Forstarchiv*, x, 8, pp. 121–123, 1934.

From accurate observations and consultation of the forest officers in 15 German silvicultural districts where all Douglas firs [*Pseudotsuga taxifolia*] infected by *Rhabdocline pseudotsugae* [see preceding abstract] were felled in 1932, the writer concludes that this method of combating the leaf fall disease is completely impracticable on a large scale.

LIESE (J.). **Absterben von Kiefernsämlingen durch Moniliopsis-Befall.** [The dying-off of Pine seedlings from *Moniliopsis* infection.]—*Forstarchiv*, x, 7, pp. 101–103, 3 figs., 1934.

Moniliopsis klebahni [*R.A.M.*, x, p. 294] was shown by inoculation experiments to be responsible for an extensive dying-off of pine seedlings in north German forest nurseries in May, 1933. Infection was contracted only by plants in moist soil with a plentiful admixture of humus.

OECHSLIN (M.). **Die Chrysomyxa rhododendri.** [*Chrysomyxa rhododendri.*]—*Schweiz. Zeitschr. für Forstwesen*, lxxxiv, pp. 1–5, 1933. [Abs. in *Neuheiten auf dem Geb. des Pflanzensch.*, xxvii, 3, pp. 62–63, 1934.]

Since 1932 spruces [*Picea excelsa*] in Switzerland have been severely attacked by the aecidial stage (*Aecidium abietinum*) of *Chrysomyxa rhododendri* [*R.A.M.*, xiii, p. 201] from an altitude of 1,250 m. to the limit of cultivation. In the late summer the spores of the rust are blown for miles by the wind in such profusion that they form, on germination, gelatinous masses on pools of water or snow. The mycelium appears to be capable of overwintering in the young needles. The red-coned spruce suffers more severely than the green-coned, especially in pure stands.

SIGGERS (P. V.). **Observations on the influence of fire on the brown-spot needle blight of longleaf Pine seedlings.**—*Journ. of Forestry*, xxxii, 5, pp. 556–562, 1 graph, 1934.

It has been experimentally demonstrated that the virulent brown spot needle blight (*Septoria acicola*) may seriously retard the growth rate of longleaf pine (*Pinus palustris*) seedlings in the southern United States [*R.A.M.*, xi, p. 813]. A single fire has been observed greatly to reduce the incidence of the disease in the first season, and often to a lesser extent in the second. Once the seedlings are established and before they emerge from the grass, controlled winter burning at three-season intervals, until a sufficient number of individuals start height growth, may be regarded as a useful silvicultural measure where the disease is injurious on areas of longleaf reproduction destined for growing timber.

Hansbrough (J. R.). **Occurrence and parasitism of Aleurodiscus amorphus in North America.**—*Journ. of Forestry*, xxxii, 4, pp. 452–458, 1 fig., 1934.

Lowland white firs (*Abies grandis*) in the Mount Hood National Forest, Oregon, were found in 1930 to be attacked by *Aleurodiscus amorphus* [*R.A.M.*, vii, p. 687], which formed narrowly elliptical cankers, with raised borders, up to 3 in. wide by 18 in. long, on stems ranging from ½ to 4 in. in diameter. Within the cankered area, the bark becomes cracked or occasionally shredded. The microscopic examination of sapwood underlying the diseased areas showed very slight penetration below the cambium by the mycelium. The centre of each canker was occupied by a dead branch stub, suggesting that the fungus develops saprophytically in the branch until entrance into the trunk is gained. This hypothesis is supported by the fact that the fruit bodies of *A. amorphus* are usually abundant on the dead branch stub, whereas no cankers have been found centred round a living lateral branch. Only one instance of branch infection by *A. amorphus* has come to the writer's notice, the host being the southern balsam fir (*Abies fraseri*) and the locality Massachusetts; otherwise the trunk appears to be the only part attacked.

In the spring of 1932 a tenth-acre plot was laid out in the above-mentioned heavy infection centre in the Mount Hood forest, in which 55 (46 per cent.) of the 119 lowland white firs showed the typical trunk cankers of the fungus, five being the maximum number on any one tree. Twelve of the diseased trees (22 per cent.) were dead. In the United States *Aleurodiscus amorphus* is known to occur on the following hosts besides those already reported: *Abies balsamea*, *A. amabilis*, *A. nobilis*, *Larix occidentalis*, *Picea mariana*, *P. engelmanni*, *P. sitchensis*, and *Pseudotsuga taxifolia*, the last-named and *Pinus strobus* being also attacked in Canada.

Amtliche Pflanzenschutzbestimmungen. [Official plant protection regulations.]—*Beil. Nachrichtenbl. Deutsch. Pflanzenschutzdienst*, vi, 1, pp. 13–14, 1934.

Germany (Province of East Prussia). As from 1st April, 1935, the cultivation of potato varieties not immune from wart disease [*Synchytrium endobioticum*] is prohibited in 14 localities of East Prussia [cf. *R.A.M.*, xiii, p. 544]. As regards the remainder of the Provinces arrangements for the application of this regulation will be made in due course.